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the ACCOUNTING REVIEW

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Quarterly Journal of the
AMERICAN ACCOUNTING ASSOCIATION

⑧

MAIN ARTICLES

Measurement Error and Statistical Sampling in Auditing: The Potential Effects
John C. Anderson and James M. Kraushaar
Accounting Numbers as Market Valuation Substitutes: A Study of Management Buyouts of Public Stockholders
Linda Elizabeth DeAngelo
Ivar Kreuger's Contribution to U.S. Financial Reporting
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Data Models Research in Accounting: An Evaluation of Wholesale Distribution Software
Ron Weber

JULY 1986

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Measurement Error and Statistical Sampling in Auditing: The Potential Effects

John C. Anderson and James M. Kraushaar

ABSTRACT: The auditing profession, in its use of existing statistical estimators and statistical procedures, has been assuming implicitly that the effect of nonsampling error on these estimators and procedures is negligible. This study investigates the potential effect of one type of nonsampling error, errors of measurement on the part of the auditor, on the behavior of alternative estimators and statistical sampling procedures in a Monte Carlo simulation study. The results indicate that the potential existence of independently occurring measurement error can significantly affect the auditor's statistical results and that the actual warranted level of confidence obtained by a statistical procedure may often be far below the desired level of confidence.

RECENT studies by Neter and Loebbecke [1975], Ramage, Krieger, and Spero [1979], and Johnson, Leitch, and Neter [1981] have provided some insight as to the characteristics of errors in audit populations. In these studies, an error was considered to be the difference between the book value of an audited unit and the auditor's value for the same unit. This treatment is consistent with the statistical procedures used in auditing practice and recent research on the use of statistical sampling in an auditing context. This approach, unfortunately, does not allow for a distinction to be made between nonsampling error on the part of the auditor and an error on the books of the audited entity. Therefore, these two components of error have essentially been treated as one and attributed to the latter component, book error.

The auditing profession's approach has been to attempt to minimize the actual occurrence of nonsampling error. The AICPA's Auditing Standards Board has issued several Statements on Auditing Standards (SAS) that in part prescribe procedures intended to accomplish the reduction of one or more types of nonsampling error. These include SAS No. 22, Planning and Control; SAS No. 25, The Relationship of Generally Accepted Auditing Standards to Quality Control Standards; SAS No. 39, Audit Sampling; and SAS No. 41, Working Papers.

Research on the use of statistical sam-

We would like to acknowledge the research assistance of Susan Noonberg and the helpful comments of Peter Battelle, Jack Grinnell, and the reviewers.

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pling includes investigations of the behavior of alternative estimators when applied to audit populations by Stringer [1963], Anderson and Teitlebaum [1973], Kaplan [1973], Neter and Loebbecke [1975, 1977], Garstka and Ohlson [1979], Frost and Tamura [1982], Duke, Neter, and Leitch [1982], and Matsumura and Tsui [1982]. In addition, there has been extensive work by Kaplan [1975], Garstka [1977], Fienberg, Neter, and Leitch [1977], Neter, Leitch, and Fienberg [1978], Reneau [1978], Lillestol [1981], Leitch et al. [1981, 1982], Menzefricke [1983], Dworin and Grimlund [1984], McCray [1984], and others on the merits of alternative statistical procedures in an auditing context. However, there has been little consideration of the potential effect(s) of nonsampling error on these estimators or on the appropriateness of the alternative statistical procedures. While estimators and new statistical procedures are still being developed and evaluated to handle the many unique and diverse accounting populations, the consideration of this additional error term, nonsampling error, appparently has been deferred.

The omission of nonsampling error in the previous research is probably due to many interrelated factors, including difficulties in assessing the effect and significance of nonsampling error on the results of statistical tests. As noted by Cochran [1968, p. 665] regarding one type of nonsampling error: "Errors of measurement can sometimes seriously vitiate most standard statistical techniques and at other times have only trivial effects." In addition, the introduction of another error term, representing nonsampling error, can complicate the assumed situation and make it difficult to derive appropriate statistical models that incorporate this nonsampling error.

Cochran [1977, p. 359] identified three types of nonsampling error:

(1) Failure to measure some of the units in a chosen sample (in survey work, this is commonly termed nonresponse error);
(2) Errors of measurement on a unit; and
(3) Errors introduced in editing, coding, and tabulating the results.

This paper investigates the potential effects of one type of nonsampling error, errors in measurement on the part of the auditor, on the behavior of some statistical estimators and the appropriateness of certain statistical sampling procedures in a Monte Carlo simulation study. The results indicate that the introduction of independently occurring measurement error can significantly affect the behavior of these statistical estimators and affect the inferences that may be made by the auditor. This finding suggests that an adjustment of the statistical procedures used in auditing should be made to account for measurement error, and that the research into alternative estimators and statistical procedures is far from complete.

Succeeding sections develop the measurement error concept, including a discussion of related factors, and describe the simulation, which includes the seeding of both book value errors and auditing measurement errors. Then the results of the simulation and the various tests are described and discussed. The final section provides the conclusions and implications of this study.

MEASUREMENT ERROR

The use of statistical sampling in auditing has generally assumed that the book value of the i^{th} sampled unit, y_i, is the sum of the true value, x_i, and some error term, e_i:

$$y_i = x_i + e_i.$$

The error term, e_i, contained in the recorded book value of the i^{th} sampled unit, can be and is equal to zero for most sampled units in many accounting populations. The sampling tests and procedures used by the auditor are intended to provide a basis from which the auditor may make inferences about the sampled accounting population. The occurrence, magnitude, and direction of non-zero book errors in a sample affect the inferences that can be made.

In this study, we also explicitly assume that the audited value, z_i, of the i^{th} sampled unit is the sum of the true value, x_i, and another error term, e_i':

$$z_i = x_i + e_i'$$

This error term, e_i', represents the auditor's measurement error, which may be equal to zero, or may be equal to the book error, e_i, for the same unit, or may have some other value.

One would expect that the auditor's measurement error, e_i', would be zero for most sampled units. However, it is also expected that measurement error will be nonzero for some sampled units. No matter how professional and how qualified an auditor is, it is difficult to presume perfection in the conduct of an audit. Indeed, the tasks necessary to attain perfection in an audit may be extremely costly or time-consuming. The use of statistical sampling to make inferences about an accounting population is itself an example of the consideration of cost versus acceptable risk on the part of an auditor.

The previous research (and existing statistical sampling tests and procedures) implicitly treat the audited value as the true value. Therefore, the difference between the book value, y_i, and the audited value, z_i, is considered the only error term (the discrepancy or audit error). In our framework, this difference will be called the perceived audit error, E_i:

$$\begin{aligned} E_i &= y_i - z_i \\ &= (x_i + e_i) - (x_i + e_i') \\ &= e_i - e_i' \end{aligned}$$

Thus, statistical estimators and tests used in auditing practice and those suggested in previous research have been designed to consider only e_i, book errors, but use data containing E_i, the perceived audit errors. This is only appropriate if there is no auditor's measurement error ($e_i'=0$) or if the auditor's measurement error has a negligible effect on the inferences made from the statistical tests.

This study of the potential effects of measurement error on statistical estimators and the appropriateness of alternative statistical procedures implicitly considers the conditions that determine when this assumption can (or cannot) be made. If auditing measurement error exists (or if there is a probability of its existence), then the factors to be considered in addressing this issue include:

1. The frequency and distribution of the underlying true accounting population, x_i, being investigated. The accounting populations being audited are very diverse as to the magnitude of the aggregate population, the number of subaccounts, and the distribution of these subaccounts. The only commonly acknowledged attribute of these accounting populations is that of high positive skewness.
2. The frequency and distribution of book errors, e_i, contained in the audited entity's records for these accounting populations. Once again, there is considerable diversity. Some accounting populations contain book errors that are almost all overstatements. Some are domi-

nated by 100 percent overstatements. Others either have more symmetrically distributed book errors or are dominated by understatements.

3. The frequency and distribution of the auditor's measurement error, e_i'. The nature of this measurement error is, at present, largely supposition. However, the existence of some auditing measurement error should be acknowledged.
4. Any confounding association between the frequencies and distributions of auditing measurement error, book error, and the underlying true accounting value.

Full analysis and understanding of these factors is further confounded by the additional complexities involved in obtaining suitable data and modeling the accounting populations found in actual practice. The data available for analysis are limited and, at present, are largely sample data. Attempts to isolate the measurement error element contained in these data have not, heretofore, been reported. There is an absence of prior work in the area of auditing measurement error.

From Cochran's [1968, p. 637] perspective, there are four potential aspects of the errors of measurement problem:

(1) The types of mathematical models that have been used to represent errors of measurement.
(2) The extent to which errors of measurement are automatically taken into account in the standard techniques of analysis and the extent to which these methods become erroneous and misleading if certain types of errors are present.
(3) The amount of harm done by errors of measurement, from the viewpoint of the investigator, in producing unsuspected biases or reduced precision, and the remedial procedures that are available to avoid these undesirable consequences.
(4) Techniques for the study of errors of measurement.

This study is an initial inquiry into the second and third aspects of the problem and should provide some additional insights as to the potential effect that the auditor's measurement may have on the behavior of statistical estimators and the possible misestimation of auditing risk concurrent with using alternative dollar-unit sampling estimators.

It is impossible to incorporate in one study all the possible sets of conditions that may exist in the accounting populations found in practice. One assumed condition in this study is that the occurrence of measurement error is independent of that of book error. This assumed condition is consistent with the notion that the auditor has made an independent assessment of the true value for the sampled units. Later studies can consider departures from this assumption.

This study also assumes that the frequency of auditing measurement error is not greater than that of book errors. There are no known studies in this area of research and there is little known about the rate or distribution of auditing measurement error. Given the expertise of the practicing accountant, the assumption should be reasonable in many instances. If it is not a reasonable assumption and auditing measurement error does have a potentially significant effect at the assumed rates, then it should also be important at higher rates.

The distributional characteristics assumed in the study were patterned after two previously studied accounts receivable populations. These populations are disparate in nature and appear to be representative of some populations reported by Neter and Loebbecke [1975]

TABLE 1

RELATIVE FREQUENCIES FOR THE STUDIED SITUATIONS

Studied Situation	*1*	*2*	*3*	*4*	*5*
Book Error (e_i)					
Relative Frequency	.10	.10	.03	.03	.01
Measurement Error (e_i')					
Relative Frequency	.10	.02	.02	.01*	.01*
Perceived Error (E_i)					
Relative Frequency**	.19	.118	.0494	.0397	.0199

* It should be noted that, when the relative frequency of measurement error in a population equals .01, a sample of 100 drawn from that population would be expected to contain one auditing measurement error on average.

** Prob (E_i) = Prob (e_i) + Prob (e_i') − Prob (e_i) × Prob (e_i') when the Book Errors and Measurement Errors occur independently.

and Johnson, Leitch, and Neter [1981] to occur in practice. The populations are more fully described in the succeeding section.

THE SIMULATION

For this study, four basic accounts receivable populations, designated as the A, A', B, and B' populations, composed of 2,000 accounts each, were developed. These basic populations were patterned after two book value populations, #1M and #4, described in Neter and Loebbecke (NL) [1975], using two different error seeding algorithms. Populations A and A', patterned after NL population #1M, are examples of positively skewed accounts receivable populations with both book overstatements and understatements. Populations B and B', patterned after NL population #4, are examples of positively skewed accounts receivable populations with only overstatements.

Neter and Loebbecke [1975] provided the distributional data and major characteristics for populations #1 and #4 in Table 2.1 [p. 12] and Table 2.12 [p. 26], respectively. They also developed a modified population, #1M, by deleting some large accounts in population #1 that would likely be examined on a 100 percent basis. Population #1M "represents that segment of the total population that an auditor will likely subject to sampling" [Neter and Loebbecke, 1975, p. 16]. The frequency distribution information for the modified population, #1M, and population #4 was used to randomly generate this study's basic populations, A, A', B, and B'.

Representative study populations are derived from the basic populations, A, A', B, and B', in a manner similar to that of Neter and Loebbecke. The study populations were designed to represent situations where book errors, e_i, occurred at several rates (.10, .03, and .01) and measurement errors, e_i', occurred independently at several rates (.10, .02, and .01). Table 1 describes the desired relative frequencies for book error, auditing measurement error, and the resultant perceived audit error for these representative studied situations.

As shown in Table 1, two book error rates, .10 and .03, provide study populations that are representative of some populations reported by Neter and Loebbecke [1975] and Johnson, Leitch, and Neter [1981]. Since an auditor may elect to examine account populations with high error rates on a 100 percent basis, higher book error rates were not considered. The studied situations are representative of those account populations that are subjected to statistical sampling and where there would be a strong likelihood of reliance on the results of this sampling.

Table 1 also identifies the two measurement error rates that were selected for each book error rate. One is relatively high compared to the assumed book error rate and another is relatively low. This combination of two book error rates and two measurement error rates provided four studied situations. In addition, a fifth studied situation with .01 book error rate and a .01 measurement error rate was generated to provide a situation similar to that discussed by Kaplan [1973, 1975] and Neter and Loebbecke [1975], where a scarcity of errors in an accounting population can be a problem for some of the statistical estimators used (or recommended for use) in sampling applications by auditors.

The development of these study populations relied on the distributional data for errors provided by Neter and Loebbecke for their populations #1M and #4. In generating errors for the population A and A' study populations, the maximum (minimum) for each error pool was increased (decreased) by ten percent from that described for NL population #1M, and a triangular distribution was assumed for each error pool.[1] The error distribution information given for NL population #4 in Neter and Loebbecke [1975, Table 2.13, p. 28] was in tainting form, (book value − audit value)/book value, and was characterized by all overstatements with a mode at 100 percent overstatements. This tainting distribution was used in generating study populations for population B'. This same distribution was modified (or halved) to obtain a distribution of all overstatements with a mode at 50 percent for the purposes of generating study populations for population B.

As mentioned above, two different methods of generating study populations were used. To obtain the study populations for basic population A, both book errors, e_i, and independently occurring measurement errors, e_i', randomly drawn from the error pools mentioned above, were seeded at the desired rates to true values, x_i, patterned after NL population #1M. This process provided a set of book values, y_i, and audit values, z_i, for each study population of basic population A.

To obtain the study populations for basic population A', perceived errors (book value—audit value), E_i, randomly drawn from the error pools, were seeded at the desired rates to the book values, y_i, patterned after the NL population #1M. This process provided a set of audit values, z_i, for each study population of basic population A'. True values, x_i, were then obtained for these study populations relying on the independence of occurrence assumption and the fact that a perceived error, E_i, is the result of a book error, e_i, and/or a measurement error, e_i'. As previously shown,

$$E_i = e_i - e_i'$$

The perceived errors (book value − audit value), E_i, were randomly attributed to book error, e_i, and/or measurement error, e_i', at the appropriate rates specified in Table 1 for each study population. When book errors and measurement errors are assumed to occur independently, there will be a small percentage of the time that both occur simultaneously. In this instance, it was necessary to obtain a randomly drawn e_i from the same error distribution and then determine both e_i' and the true value, x_i.

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[1] Information as to the exact shape of the error distribution in each error pool for *NL* population #1M was not available. However, information as to the minimum, maximum, and mean for each error pool was provided in Neter and Loebbecke [1975, Table 2.2, p. 15]. The triangular distribution allows us to approximate the distribution for each error pool from the given information.

In the first method of deriving study populations, the true value distribution is taken as given and both book errors and measurement errors are seeded to obtain the book values and audit values. The perceived error then can be determined. In the second method, the book value distribution is taken as given and the perceived errors are seeded to obtain audit values. These perceived errors are then randomly attributed to underlying book errors and/or measurement errors, and true value is determined. The first method is consistent with the idea that two independent assessments of the true value of a sampled item are being made. These assessments are sometimes in error and the perceived audit error is the result. The second method is consistent with the observed or perceived error distribution reported by Neter and Loebbecke [1975] and can be viewed as a procedure that attempts to deduce the book errors and measurement errors that could have created this perceived error distribution.

The major characteristics of the generated values for each of the studied situations based on populations A and A' were examined and compared. The book value, audit value, and true value characteristics for the studied situations were remarkably similar and did not seem to reflect any of the differences that had been seeded into the data. The difference in error rates and method used to generate the study populations appeared to be obscured. This would indicate that a simple examination of book value characteristics does not necessarily assist the auditor (or the researcher) in making accurate inferences as to the frequency and distribution of errors contained in the book populations. These book values, audit values, and true values have characteristics similar to the book distributions presented by Neter and Loebbecke [1975] and those described in Johnson, Leitch, and Neter [1981] and Ramage, Krieger, and Spero [1979].

The study populations for basic populations B and B' were generated in a manner similar to that used for the study populations of basic populations A and A'. The process of generating the study populations for population B was the same as that used for population A study populations. Book errors, e_i, and independently occurring measurement errors, e_i', were randomly drawn from the modified distribution mentioned previously and seeded at the desired rates to the true values, x_i, patterned after the book value distribution given for NL population #4.

The study populations for population B' were generated by the same method as that used to generate the study populations for population A'. Perceived errors, E_i, randomly drawn from the original tainting distribution for NL population #4, were seeded at the desired rates to book values, y_i, patterned after the NL population #4. This procedure provided a set of audit values, z_i, for each study population of basic population B'. The perceived errors, E_i, were randomly attributed to book error, e_i, and/or measurement error, e_i', consistent with the independence of occurrence assumption and the desired rates specified in Table 1 for each study population.

In the first method, the true value is given, and both the book errors and measurement errors consistent with all perceived overstatements and a mode at

50 percent overstatement tainting were seeded into the data.[2] The second method assumes the book value is given and that this book value distribution contains apparent taintings which are all overstatements with a mode at 100 percent overstatements. The major characteristics of book values, audit values, and true values for the study populations of basic populations B and B' were remarkably similar and did not seem to reflect any of the differences in errors that had been seeded into the data. These book value, audit value, and true value characteristics agreed quite closely with those prescribed by Neter and Loebbecke [1975] and those described in Johnson, Leitch, and Neter [1981] and Ramage, Krieger, and Spero [1979].

Tables 2A and 2B present the major characteristics for the seeded book (e_i), measurement (e_i'), and perceived (E_i) errors for each of the studied situations of basic populations, A, A', B, and B'. It should be noted that, in the generation of the studied situations for populations A and A', an implicit assumption has been made that auditing measurement error will be composed of both overstatements and understatements when the books contain both types of misstatements. Also, in the generation of the studied situations for populations B and B', the perceived error (book value − audit value) was designed to be composed of all overstatements. As a direct result, the auditing measurement errors generated for the studied situations of populations B and B' are dominated by understatements.

These differences, and differences created by randomness, different seeding frequencies, and generation method are readily seen. While the distributions of measurement error for the studied situations of populations A and A' are not considered skewed, a consistent difference is noted in the sign of both the mean amount and the total amount of measurement error between these two groups of studied populations. In addition, differences created by the two different tainting distributions used in generating the errors that were seeded to the study populations of basic populations B and B' are apparent. We find that the distributional characteristics (other than frequency) of these groups of studied situations are distinctly different from each other. Therefore, the study populations created are similar to book value populations reported to exist in practice, with differences in seeded errors useful for assessing the potential effects of measurement error on statistical estimators.

Summary of Simulation Procedures

Step 1 of the simulation procedure, generating an empirical population of 2,000 accounts with corresponding true, book, and audit values for each studied situation, employed two distinct methods. The first method used to generate the studied situations for populations A and B involves three distinct stages:

A. Create population(s) of 2,000 true account values (x_i) patterned after the distribution statistics given by Neter and Loebbecke [1975].

B. Given the assumed distribution of true account values (x_i), create book values (y_i) by seeding in book errors (e_i) as:

$$y_i = x_i + e_i$$

---

[2] An actual overstatement of 100 percent requires a true value of zero. The method used to generate study populations for basic populations A and B seeded errors to given populations of nonzero true values. The use of the modified distribution provides study populations that appear representative of some account populations occurring in practice and that are alternatives to the study populations generated for population B'.

TABLE 2A

MAJOR CHARACTERISTICS OF ERRORS (BOOK, e_i, MEASUREMENT, e_i', AND PERCEIVED, E_i) IN STUDIED SITUATIONS FOR POPULATIONS A AND A'

	Population A					*Population A'*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Book Error										
Frequency (%)	10.00	10.00	3.00	3.00	1.00	9.95	9.95	3.00	3.00	1.00
Mean Amount	−1.68	−1.01	−2.45	−2.45	−4.78	−3.01	−2.79	−3.49	−3.32	−6.63
Std. Deviation	8.44	8.14	8.20	8.20	7.07	10.87	10.44	11.33	11.27	9.82
Skewness	.15	.54	.10	.10	−1.01	.27	.27	.77	.75	−.56
Kurtosis	.58	3.72	.31	.31	.37	1.68	1.46	2.92	2.99	−.02
Total Amount	−335.53	−202.32	−146.81	−146.81	−95.66	−598.42	−554.30	−209.42	−199.15	−132.58
Measurement Error										
Frequency (%)	10.00	1.95	2.00	1.00	1.00	9.90	2.00	1.95	1.00	1.00
Mean Amount	−1.64	−1.39	−3.90	−3.81	−1.68	2.66	3.42	1.93	.81	3.99
Std. Deviation	7.52	8.60	8.40	8.73	7.00	10.40	10.51	9.91	9.34	9.88
Skewness	−.07	.14	−.14	.59	.67	−.10	.30	−.17	−.54	−.50
Kurtosis	1.03	.97	1.93	2.44	.08	1.67	.57	.34	.91	−.06
Total Amount	−328.53	−54.13	−155.96	−76.14	−33.55	526.47	136.63	75.14	16.11	79.78
Perceived Error										
Frequency (%)	19.00	11.75	4.95	3.95	2.00	18.85	11.75	4.90	3.95	2.00
Mean Amount	−.02	−.63	.09	−.90	−1.55	−2.98	−2.94	−2.90	−2.72	−5.31
Std. Deviation	8.13	8.35	8.85	8.77	7.67	10.10	10.59	10.66	10.88	9.81
Skewness	.03	.38	.13	.00	−.61	−.03	.12	.56	.66	−.02
Kurtosis	.71	2.89	.64	.23	.25	1.11	1.30	2.25	2.53	.11
Total Amount	−7.00	−148.19	9.15	−70.67	−62.11	−1124.89	−690.93	−284.56	−215.26	−212.36

TABLE 2B

MAJOR CHARACTERISTICS OF ERRORS (BOOK, e_i, MEASUREMENT, e'_i, AND PERCEIVED, E_i) IN STUDIED SITUATIONS FOR POPULATIONS B AND B'

	Population B					*Population B'*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Book Error										
Frequency (%)	10.00	9.95	3.00	3.00	3.00	10.00	10.00	3.00	3.00	1.00
Mean Amount	135.59	129.32	21.23	21.23	6.30	1219.26	1241.34	1358.61	1355.75	630.16
Std. Deviation	1255.45	1250.66	363.94	363.94	172.41	3464.88	3467.11	3974.78	3975.71	1647.31
Skewness	14.14	14.76	25.64	25.64	37.26	4.31	4.28	4.31	4.31	3.66
Kurtosis	227.42	241.67	720.03	720.03	1476.42	20.77	20.60	21.58	21.57	13.95
Total Amount	271181.60	258642.59	42456.26	42456.26	12603.07	243852.75	248267.19	81516.92	81345.22	12603.11
Measurement Error										
Frequency (%)	10.00	2.00	2.00	1.00	1.00	10.00	2.00	2.00	1.00	1.00
Mean Amount	−58.71	−19.77	−13.39	−5.64	−8.12	−939.48	−1786.41	−695.86	−757.93	−1623.76
Std. Deviation	601.13	396.59	272.06	123.85	192.51	2982.98	5226.21	1490.47	1623.69	3584.60
Skewness	−15.35	−26.32	−31.69	−26.92	−26.79	−5.54	−3.71	−3.01	−3.38	−2.28
Kurtosis	260.54	739.44	1147.65	764.60	736.84	35.36	13.60	9.12	12.31	3.88
Total Amount	−117410.58	−39537.56	−26784.62	−11279.25	−16237.50	−187895.10	−71456.18	−27834.58	−15159.04	−32475.13
Perceived Error										
Frequency (%)	19.00	11.75	4.95	3.95	2.00	19.00	11.80	4.95	3.95	2.00
Mean Amount	194.30	149.09	34.62	26.87	14.42	1136.18	1354.76	1104.56	1221.57	1126.96
Std. Deviation	1386.90	1310.49	454.34	384.81	258.23	3306.03	3831.03	3238.87	3556.41	2799.12
Skewness	11.58	13.49	19.90	22.57	22.11	4.70	4.23	5.03	4.68	2.91
Kurtosis	158.78	205.15	439.96	582.60	517.01	24.80	19.23	31.08	26.21	7.56
Total Amount	388592.18	298180.15	69240.88	53735.51	28840.57	431747.85	319723.37	109351.50	96504.26	45078.24

C. Given the assumed distribution of true account values (x_i), create audit (z_i) values by seeding in audit errors (e_i') as:

$$z_i = x_i + e_i'$$

The second method used to generate the studied situations for populations A' and B' also involves three stages:

A. Create population(s) of 2,000 book values (y_i) patterned after the distribution statistics given by Neter and Loebbecke [1975].

B. Given the assumed distribution of book values (y_i), create audit values (z_i) by randomly selecting perceived audit errors (E_i) as:

$$z_i = y_i - E_i$$

C. Given the book values (y_i), the perceived audit errors (E_i), and the audit values (z_i), determine the book errors (e_i), the measurement errors (e_i'), and true account values (x_i) by randomly attributing the perceived error (E_i) to underlying book errors (e_i) and/or measurement errors (e_i') at appropriate rates.

$$E_i = e_i - e_i'$$

Step 2 for all populations involves taking a sample of 100 accounts from a studied situation population generated in step one using dollar-unit sampling procedures.

A. Create a cumulative book value index for population of accounts;

B. Randomly select a number, *RNDX*, from one to total book value;

C. Select the account whose cumulative book index is just $\geq RNDX$; and

D. Repeat B and C (immediately above) until a sample of 100 accounts has been selected.

Step 3 estimates the total audit value of all 2,000 accounts based on the sample of 100 using various statistical estimators as follows:

A. Dollar Unit Mean Per Unit (*MPU*) expansion estimator, $\hat{Z}_{MPU}$, as described in Neter and Loebbecke [1975]:

$$\hat{Z}_{MPU} = \left[1/n \sum_{i=1}^{n} (z_i/y_i) \right] Y$$

where Y is total book amount for all accounts and y_i and z_i are the book and audit amounts, respectively, for the i^{th} account in the sample of size n.

The standard error for this *MPU* estimator is:

$$\hat{S}_{\hat{z}_{MPU}} = Y\hat{S}_r/\sqrt{n}$$

where $\hat{S}_r = \sqrt{\sum_{i=1}^{n} (r - \bar{r}_i)^2/(n-1)}$

and $r_i = z_i/y_i,\ \bar{r}_i = 1/n \sum_{i=1}^{n} r_i.$

The confidence interval is constructed

$$\hat{Z}_{MPU} + Z\hat{S}_{\hat{z}_{MPU}}$$

where Z is the standard normal deviate for the desired confidence level (90 percent in our study).

B. Garstka-Ohlson [1979] estimator (*GO*) of total audit value is

$$\hat{Z}_{GO} = \hat{Z}_{MPU}.$$

The standard error for this *GO* estimator is

$$\hat{S}_{\hat{z}_{GO}} = \hat{S}_{\hat{z}_{MPU}}.$$

The confidence interval is constructed

$$\hat{Z}_{GO} + C_{m,n}\hat{S}_{\hat{z}_{GO}}$$

where $C_{m,n}$ is the Garstka-Ohlson deviate for the desired confidence level calculated as follows:

$$C_{m,n}=\left[\frac{nPu(1-\alpha,m)}{m}-1\right]\left[\frac{mn}{n-m}\right]^{1/2}$$

where m is the observed number of errors in the sample, $Pu(1-\alpha,m)$ is the $1-\alpha$ upper confidence limit for the binomial parameter P (error rate) when m errors are observed in the sample, and n is the sample size.

C. Combined attribute and variable (*CAV*) estimator of the upper and/or lower bound for total audit value involves two possible variations, as described by Bailey [1981] and others.

(1) For over- and understatement populations (i.e., populations A and A' in our study),

(a) $\hat{Z}_{CAV_L}=$

$$Y-Y\left[\sum_{j=1}^{J} A(j)E_o(j)\right]$$

where Y is total book value for all N (2,000 accounts) and

$$E_o(j)=(y_j-z_j)/y_j$$

for the j^{th} account in error. The $E_o(j)$ are overstatement taintings ranked from largest to smallest and $A(j)$ are error adjustment factors as presented in Arens and Loebbecke [1981, p. 297]. J is the total number of over statements.

(b) Similarly,

$\hat{Z}_{CAV_U}=$

$$Y-Y\left[\sum_{j=1}^{J} A(j)E_u(j)\right]$$

where $E_u(j)$ are the understatement taintings ranked from largest absolute value to smallest.

(2) For overstatement only populations (i.e., populations B and B' in our study),

(a) $\hat{Z}_{CAV_L}=$

$$Y-Y\left[\sum_{j=1}^{J} A(j)E_o(j)\right]$$

(b) $\hat{Z}_{CAV_U}=Y$

D. Dworin-Grimlund [1984] estimator (*DG*) was calculated for population B as follows:

(a) $\hat{Z}_{DG_L}=Y-Y\,CB_\alpha$

where the confidence bounds, CB_α, are as defined in Dworin and Grimlund [1984, p. 222] with $\alpha=.10$.

(b) $\hat{Z}_{DG_U}=Y$

Step 4 determines if the known (for our simulation study) total true value (and total audit value) has been correctly captured in each of the four intervals (*MPU, GO, CAV,* and *DG*).[3]

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[3] The estimators selected are representative of the many alternative estimators used in practice and/or suggested in the literature. At this time, there is no statistical estimator that is deemed ideal for all auditing situations. While the dollar-unit mean per unit (MPU) estimator has some advantages over the other estimators, this estimator has been criticized as not being reliable at very low error rates [Neter and Loebbecke, 1975 and others]. The *GO* estimator is a suggested improvement, having reported advantages at low error rates

Step 5 repeats steps 2, 3, and 4 500 times. This step is necessary to assure that reasonably precise estimates of the actual confidence levels were obtained. The selection of the number of replications was made after applying an algorithm suggested by Arkin [1974, p. 84] for a binomial event to some initial runs of the simulation.

Finally, step 6 involves the analysis of the confidence bounds based on 500 samples, each of size 100. This analysis involves studied situation data for populations *A*, *A'*, *B*, and *B'* as to:

A. The percentage of *MPU, GO, CAV*, and *DG* limits that correctly captures the true total value to obtain an actual level of confidence and, for comparison, the percentage of each limit that correctly captures the total audit value to obtain the apparent level of confidence;
B. The mean, standard deviation, coefficient of variation, minimum, and maximum *CAV* and *DG* intervals.

In any Monte Carlo simulation study, there is a concern that the data and/or decision rules may seriously bias the results and lead to unwarranted findings. As a foundation for the development of studied situations, this study employs the previously reported distribution data of two disparate accounts receivable populations, said to be representative of some account populations existing in practice. There is little known bias that necessarily results from this choice of a simulation data basis. In addition, the simulation procedures described above are as uncomplicated as possible, to ensure against any unnecessary decision rule effect on reported results.

SIMULATION RESULTS

Tables 3A and 3B present the results of the replicated sampling procedure, described in the previous section, for each studied situation of populations *A* and *A'* and populations *B* and *B'*, respectively. In these tables, the proportion of intervals, using the *MPU, GO, CAV*, and *GD* estimators, containing the total true underlying population value and, hence, deemed actually correct, is reported. This porportion is an estimate of the appropriate (or actual) degree of confidence that the true value will be within the intervals, which were constructed for a desired 90 percent level of confidence. The standard error, in parentheses, provides information about the achieved precision of this proportion of actually correct intervals. For comparison, the proportion of intervals using the same estimators, containing the total audit population value, and therefore perceived correct, is reported, and a difference between this perceived proportion correct and the actual proportion correct is calculated and reported.[4]

As reported in Table 3A, the perceived correct proportion for the *MPU* estimator is frequently (eight of the ten studied situations) less than the desired level of confidence for the populations *A*

[Garstka and Ohlson, 1979]. On the other hand, the commonly used *CAV* technique is considered excellent at low error rates but is criticized as being overly conservative with excessively large bounds [Neter and Loebbecke, 1975 and others]. Recently, the *DG* estimator has been developed and is said to have the advantage of being less conservative, with more appropriate bounds relative to the bounds of the *CAV* technique [Dworin and Grimlund, 1984].

[4] We also performed the analysis using study populations patterned after Neter and Loebbecke's population #1. The results were similar to those reported for populations *A* and *A'*, patterned after Neter and Loebbecke's population #1M.

TABLE 3A

THE PROPORTION OF INTERVALS CONTAINING THE AUDIT VALUE (PERCEIVED CORRECT) AND THE TRUE VALUE (ACTUAL CORRECT) FOR THE STUDIED SITUATIONS OF POPULATIONS *B* AND *B'*

	Population A					*Population A'*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Mean Per Unit Estimator										
Perceived Correct	.904	.696	.902	.822	.590	.806	.782	.734	.656	.384
(Std. Error)	(.013)	(.021)	(.013)	(.017)	(.022)	(.018)	(.018)	(.020)	(.021)	(.022)
Actual Correct	.882	.640	.662	.580	.502	.888	.830	.804	.680	.406
(Std. Error)	(.014)	(.021)	(.021)	(.022)	(.022)	(.014)	(.017)	(.018)	(.021)	(.022)
Difference**	+.022	+.056*	+.240*	+.242*	+.088*	−.082*	−.048*	−.070*	−.024*	−.022*
Garstka-Ohlson Estimator										
Perceived Correct	.958	.786	.984	.958	.616	.858	.850	.898	.876	.418
(Std. Error)	(.009)	(.018)	(.006)	(.009)	(.022)	(.016)	(.016)	(.014)	(.015)	(.022)
Actual Correct	.942	.738	.914	.912	.600	.944	.910	.942	.886	.480
(Std. Error)	(.010)	(.020)	(.013)	(.013)	(.022)	(.010)	(.013)	(.020)	(.014)	(.022)
Difference**	+.016	+.048*	+.070*	+.046*	+.016	−.086*	−.060*	−.044*	−.010	−.062*
Combined Attribute Variable Estimator										
Perceived Correct	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
(Std. Error)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Actual Correct	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
(Std. Error)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Difference**	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

* Proportions are different at a 90 percent level of confidence using the dependent sample approach of McNemar [1947].

** Difference = perceived proportion correct − actual proportion correct.

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TABLE 3B

THE PROPORTION OF INTERVALS CONTAINING THE AUDIT VALUE (PERCEIVED CORRECT) AND THE TRUE VALUE (ACTUAL CORRECT) FOR THE STUDIED SITUATIONS OF POPULATIONS *B* AND *B′*

	Population B					*Population B′*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Mean Per Unit Estimator										
Perceived Correct	.882	.898	.840	.804	.748	.898	.900	.782	.920	.568
(Std. Error)	(.014)	(.014)	(.016)	(.018)	(.019)	(.014)	(.013)	(.013)	(.012)	(.022)
Actual Correct	.594	.888	.866	.890	.694	.372	.772	.914	.910	.560
(Std. Error)	(.022)	(.014)	(.015)	(.014)	(.021)	(.022)	(.019)	(.013)	(.013)	(.022)
Difference**	+.288*	+.010	−.026	−.086*	+.054*	+.526*	+.128*	−.132*	+.010	+.008
Garstka-Ohlson Estimator										
Perceived Correct	.926	.938	.920	.898	.750	.938	.940	.942	.924	.568
(Std. Error)	(.021)	(.011)	(.012)	(.014)	(.019)	(.011)	(.011)	(.010)	(.012)	(.022)
Actual Correct	.658	.942	.940	.898	.758	.476	.886	.940	.924	.568
(Std. Error)	(.021)	(.010)	(.011)	(.014)	(.019)	(.022)	(.014)	(.011)	(.012)	(.022)
Difference**	+.268*	−.004	−.020*	.000	−.008	+.462*	+.054*	+.002	.000	.000
Combined Attribute Variable Estimator										
Perceived Correct	.978	.984	1.000	1.000	1.000	.988	.954	.944	.942	1.000
(Std. Error)	(.007)	(.006)	(.000)	(.000)	(.000)	(.005)	(.009)	(.010)	(.010)	(.000)
Actual Correct	1.000	.994	1.000	1.000	1.000	1.000	.992	1.000	1.000	1.000
(Std. Error)	(.000)	(.003)	(.000)	(.000)	(.000)	(.000)	(.004)	(.000)	(.000)	(.000)
Difference**	−.022*	−.010	.000	.000	.000	−.012	−.038*	−.056*	−.058*	.000
Dworin-Grimlund Estimator										
Perceived Correct	.968	.984	1.000	1.000	1.000	.994	.980	.954	.964	1.000
(Std. Error)	(.008)	(.006)	(.000)	(.000)	(.000)	(.003)	(.006)	(.009)	(.008)	(.000)
Actual Correct	1.000	.994	.998	1.000	1.000	1.000	.992	1.000	.988	1.000
(Std. Error)	(.000)	(.003)	(.000)	(.000)	(.000)	(.000)	(.004)	(.000)	(.005)	.000
Difference**	−.032	−.010	+.002	.000	.000	−.006	−.012	−.046*	−.024*	.000

* Proportions are different at a 90 percent level of confidence using the dependent sample approach of McNemar [1947].

** Difference = perceived proportion correct − actual proportion correct.

and *A*′. This result is consistent with results previously reported by Neter and Loebbecke [1975] and others. Further, the actual correct proportions for this *MPU* estimator are all lower than the perceived correct proportions for the five studied situations of population *A*. In four of the five studied situations, this difference was found to be significant using the dependent sample test of McNemar [1947]. The actual correct proportions in these studied situations, #2, #3, #4, and #5, are far below the desired level of confidence. The actual correct proportions for this *MPU* estimator are all higher than the perceived correct proportions for the studied situations of population *A*′. These differences were found to be significant for all five studied situations of population *A*′. Thus, the effect of measurement error on the behavior of a statistical estimator (in this case, the *MPU* estimator) is found to be significant. However, the direction of the effect (the difference between the perceived proportion correct and the actual proportion correct) depends on the population being studied.

The *GO* estimator appeared to perform better relative to the *MPU* estimator in the studied situations for both populations *A* and *A*′. The perceived correct proportions for the *GO* estimator were closer to (or higher than) the desired level of confidence for all studied situations. While the actual correct proportions for the *GO* estimator for the studied situations of population *A* were all lower than the perceived correct proportions, this difference was less than that reported for the *MPU* estimator. In three of five situations of population *A*, this difference between actual correct and perceived correct proportions was found to be significant. Consistent with the results reported for the *MPU* estimator, the proportion actually correct was higher for all studied situations of population *A*′ than the perceived correct proportions and was significantly higher in four of the five situations. While the *GO* estimator may have an advantage at lower error rates over the *MPU* estimator [Garstka and Ohlson, 1979], both *MPU* and *GO* estimators performed poorly at the low error rates in the study situation #5 of both populations *A* and *A*′. This observation is consistent with Tamura's [1985] finding that the performance of the *GO* estimator at low error rates can depend on the characteristics of the population being sampled. In general, the *GO* estimator appeared to be more robust and was less affected by measurement error than the *MPU* estimator.

As shown in Table 3A, the perceived correct and actual correct proportions for the Combined Attribute Variable (*CAV*) bound technique were 100 percent for all studied situations of populations *A* and *A*′. Similar results for the *CAV* technique are reported in Table 3B, where the perceived correct and actual correct proportions for the studied situations of populations *B* and *B*′ are found usually to be 100 percent and always well in excess of the desired level of confidence. These results indicate that the *CAV* bound is overly conservative, and are consistent with previous findings reported by Neter and Loebbecke [1975], Dworin and Grimlund [1984], and others. While some of the actual correct proportions were found to be significantly different than the perceived correct proportions, these bounds were so broad (conservative) that the existence of measurement error did not cause the proportion actually correct to fall below the desired level of confidence.

As shown in Table 3B, the perceived correct proportions for the *MPU* estimator in eight of the ten studied situations of populations *B* and *B*′ are lower than the desired level of confidence. The actual correct proportions are lower than the perceived correct proportions in seven of the ten studied situations for populations *B* and *B′*. There is a significantly lower actual correct proportion than perceived correct proportion in studied situations #1 and #5 of population *B* and studied situations #1 and #2 of population *B′*. In studied situation #3 of population *B′*, the proportion actually correct was significantly higher than the perceived correct proportion.

The *GO* estimator also performed better in general than the *MPU* estimator for populations *B* and *B′*. However, the actual correct proportion was found to be significantly lower than the perceived correct proportion for studied situation #1 of population *B* and studied situations #1 and #2 of population *B′*. The perceived correct proportion was significantly higher than the actual correct proportion for studied situation #3 of population *B*.

Dworin and Grimlund [1984] have suggested that the *DG* estimator has an advantage over the *CAV* bound technique because it provides tighter bounds than the *CAV* technique. On examination of Table 3B, the use of the *DG* estimator results in perceived correct and actual correct proportions well above the desired level of confidence and appears to be even more conservative than the *CAV* bound technique as it relates to population *B′* studied situations. Table 4 confirms this finding. The mean interval for the *DG* estimator is always larger than the *CAV* mean interval for the studied situations of population *B′* and is always less than the *CAV* mean interval for population *B*. The reported advantage of the *DG* estimator appears to depend on the population to which it is applied.

Comparing the *CAV* mean intervals of populations *A* and *A′* to a total true value of approximately $80,000, the *CAV* bounds appear to be overly conservative (varying from six to 11 percent of total true value) at all rates of error represented by the studied situations. A comparison of the *CAV* and *DG* mean intervals of populations *B* and *B′* to a total true value of approximately $3,700,000, these bounds (varying from three to 20 percent of total true value) appear overly conservative at higher rates, particularly at the rates used in studied situations #1 and #2.

CONCLUSIONS AND IMPLICATIONS

The basic concern of this study has been the adequacy or robustness of existing statistical estimators and procedures in coping with errors of measurement on the part of the auditor. This study's results indicate that auditing measurement error can significantly affect the behavior of statistical estimators when applied to audit populations. When the results of applying the dollar-unit mean per unit expansion estimator and the Garstka-Ohlson estimator are examined, the actual proportion of correct confidence intervals is often much less than perceived, even if the rate of measurement error is relatively low. At other times, the actual proportion of correct confidence intervals is much higher than both the perceived and the desired levels of confidence. The unknown risks due to measurement error assumed by auditors in their reliance on existing statistical estimators and audit procedures may be quite large.

In a different context, Waller and Felix [1984, p. 637] have stated:

> Auditors' self-perception of their judgement ability are likely to affect the search for and/or interpretation of experiential information, and thus their learning from experience, as well as the degree of reliance they place on struc-

TABLE 4

MAJOR CHARACTERISTICS FOR CAV AND DG INTERVALS FOR STUDIED SITUATIONS OF POPULATIONS *A*, *A'*, *B*, AND *B'*

	Population A					*Population A'*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
CAV Interval										
Mean Interval	8243.	6337.	6092.	5558.	5073.	9317.	7592.	6234.	6006.	5278.
(Std. Error)	(65.)	(38.)	(60.)	(27.)	(18.)	(77.)	(61.)	(43.)	(52.)	(30.)
Std. Deviation	1452.	857.	1348.	601.	394.	1727.	1362.	953.	1153.	680.
Coeff. Variation	.18	.14	.22	.11	.08	.19	.18	.15	.19	.13
Minimum	5713.	4922.	4802.	4802.	4805.	5963.	5259.	4811.	4811.	4811.
Maximum	15528.	9993.	18702.	9975.	7213.	15429.	12469.	10055.	11627.	7975.

	Population B					*Population B'*				
Studied Situation	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
CAV Interval										
Mean Interval	579319.	469147.	182941.	155501.	127746.	715916.	539724.	244604.	219019.	133534.
(Std. Error)	(4235.)	(3555.)	(1974.)	(1665.)	(1459.)	(6588.)	(5993.)	(3743.)	(3320.)	(2236.)
Std. Deviation	94698.	79483.	44150.	37220.	32625.	147301.	134008.	83706.	74243.	50004.
Coeff. Variation	.16	.17	.24	.24	.26	.21	.25	.34	.34	.37
Minimum	321074.	245012.	87902.	87775.	86040.	315708.	159813.	85750.	85750.	85750.
Maximum	821847.	719174.	321721.	272029.	240885.	1282592.	947721.	579295.	445895.	298633.
DG Interval										
Mean Interval	564621.	460904.	163124.	134237.	113389.	747251.	579229.	261573.	228170.	146568.
(Std. Error)	(4075.)	(3577.)	(2150.)	(1715.)	(1380.)	(6753.)	(6495.)	(4453.)	(3946.)	(2289.)
Std. Deviation	91117.	145224.	48077.	38349.	30862.	150997.	145224.	99569.	88243.	51174.
Coeff. Variation	.16	.25	.29	.29	.27	.20	.25	.38	.39	.35
Minimum	305156.	146216.	66786.	70942.	70380.	323283.	146216.	88102.	63030.	68197.
Maximum	796909.	994862.	315307.	265474.	235984.	1299792.	994862.	640309.	505404.	343464.

Note: CAV Interval = Upper CAV bound − Lower CAV bound
DG Interval = Upper DG bound − Lower DG bound

> tural aids. However, self-perceived judgement ability can diverge from actual judgement ability because of incomplete outcome feedback and related factors. Thus, it is important to inquire into the nature of auditors' self-perceived judgement ability and the factors that affect it.

In practice, there has been difficulty in assessing the real-world occurrence of measurement error on the part of the auditor. In a sense, this has been due to the difficulty in auditing the auditor (or his work) and ascertaining whether the audited value of any sampled unit is or is not the true value. If nonsampling error is not identified as such, then its impact on the risk to an auditor in assessing the existence (or nonexistence) of material error cannot be ascertained. Due to this "incomplete information feedback," the auditor's "self-perceived judgment ability" has presumably been unaffected, and the possibility of measurement error on the part of the auditor is ignored in existing statistical sampling tests and procedures. Therefore, auditors currently using existing statistical estimators and auditing procedures may be in a situation where "actual judgment ability" can seriously diverge from "self-perceived judgment ability" because they have not considered the potential effects of measurement error.

However, some awareness of this divergence could help explain why the *CAV* bound technique is widely used in practice. While the *CAV* bound technique is generally acknowledged to be overly conservative (except possibly at very low error rates), a conservative bound may have a useful role in maintaining confidence levels when there exist unknown risks (such as the risk due to measurement error).[5] If this is the case, the extremely large bounds and lack of precision entailed in the use of the *CAV* technique (or the recently suggested Dworin-Grimlund estimator) could be viewed as a cost of not knowing the true extent and nature of the measurement error problem.

The results reported in this study are, to an extent, a function of the assumed distribution and frequency for the measurement errors being seeded into the data. However, the results are not a direct function in the sense of being known in advance. As Cochran [1968, p. 665] and others have noted, the measurement error effect is a complex issue, sometimes having serious consequences and sometimes having insignificant (or trivial) consequences. Any prior assessment of the measurement error consequences is further complicated by the uniqueness and diversity of the accounting populations being audited. The purpose of our paper was to determine if a reasonably assumed distribution and frequency of independently occurring measurement error could have a significant (in an auditing sense) effect. Our results indicate that a significant effect potentially exists and that the significance of the effect appears to depend on the studied situation. At present, there is an absence of reported work in the area of auditing measurement error and very little is known about the rate, distribution, and consequences of auditing measurement errors in practice. This condition should not continue.

Suggested areas of research would include: (1) additional assessments of the characteristics and conditions under which measurement error may have serious effects; (2) the development of techniques for the study of errors in measurement useful in ascertaining the actual occurrence of measurement error in the conduct of audits; (3) the development of mathematical models that can incorporate errors of measurement and allow the development of more appropriate statistical estimators; and (4) additional consideration of audit procedures that may be available to avoid the undesirable effects of auditing measurement error.

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[5] This observation was suggested by a reviewer.

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Accounting Numbers as Market Valuation Substitutes: A Study of Management Buyouts of Public Stockholders

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ABSTRACT: This study investigates the accounting decisions made by managers of 64 New York and American Stock Exchange firms who proposed to purchase all publicly-held common stock and "go private" during 1973-1982. These management buyouts engender potentially severe conflicts of interest for insider-managers, who both have a fiduciary duty to negotiate fair value for the publicly-held shares and are themselves the purchasers of those shares. Although managers virtually always engage an independent investment banker to evaluate the offer terms, the typical management buyout nonetheless generates litigation by public stockholders who claim their compensation is inadequate. Because the courts and investment bankers employ earnings-based valuation methods to assess fair value, managers have incentives to understate reported income in attempts to reduce the buyout compensation. However, a variety of tests that employ the recently developed accrual methodology reveal no indication that managers of sample firms systematically understated earnings in periods before a management buyout of public stockholders.

AGENCY theory posits that accounting numbers play a central role in mitigating conflicts of interest between insider-managers and outside stockholders of public corporations. These conflicts are especially severe in a management buyout or "going private" transactions through which managers of a public corporation purchase all common stock held by outsiders. The potential for insider-managers to breach their fiduciary duty to outside stockholders by paying them less than fair value for their shares has concerned the Securities and Exchange Commission (SEC) since at least the mid-1970s [Sommer, 1974], and the recent boom in leveraged buyouts has kindled significant concern about

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these transactions in the financial community.[1] To mitigate the appearance of managerial self-dealing in these nonarm's-length acquisitions, managers virtually always engage an investment banker to express an independent opinion that the buyout compensation represents fair value. Despite this precaution, the typical management buyout generates litigation by public stockholders who claim that managers' informational advantage enables them to purchase the publicly-held shares at a price that, although it exceeds the open market stock price, is nonetheless inadequate.

Because the allegedly inadequate compensation represents an above-market premium, the courts and investment bankers do not rely exclusively on the market price as a measure of fair value, but rather they devise alternative benchmarks against which to evaluate the buyout compensation. The valuation approaches they use accord major emphasis to earnings capitalization methods based on the firm's historical earnings, and this emphasis on reported income provides managers with incentives to understate earnings in attempts to lower the buyout compensation. For example, a recent *Wall Street Journal* article states:

> Regulators and some businessmen are concerned about management's ability to manipulate financial results to make a leveraged buyout easier or cheaper. Such manipulation could involve holding down current earnings and strengthening future profits by making costly improvements in plant and equipment or by introducing more conservative accounting procedures [*The Wall Street Journal,* December 29, 1983, p.1].

Additionally, an SEC Commissioner has publicly expressed concern that managers can successfully depress the firm's stock price by understating reported earnings in periods before the management buyout [Longstreth, 1983]. If so, they can offer what appears to be a reasonable premium above market, but one that is nonetheless inadequate because the market price does not fully reflect management's inside information. Firms that go private typically face no future public disclosure requirements,[2] so managers who can delay the release of positive inside information face little risk that their actions will later be discovered and punished.

This study investigates the accounting decisions made by managers of 64 New York and American Stock Exchange firms who proposed a management buyout of public stockholders during 1973-1982. The data reveal no indication that these managers systematically selected accounting accruals to understate the public corporation's reported income in periods before the buyout. The next section provides institutional background and describes the role accounting numbers play in these nonarm's-length acquisitions. The following section contains sample selection procedures and descriptive statistics. Then two sections report tests of the hypothesis that managers of sample firms systematically selected accounting accruals in periods before the buyout that were significantly lower than those they had chosen in prior periods.

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[1] A leveraged buyout is a going-private transaction in which the subsequent private firm makes extensive use of financial leverage. Concerns about leveraged buyouts are enumerated in articles in *Newsweek* (December 19, 1983), *Fortune* (November 7, 1983, January 23, 1984, and November 11, 1985), *The Economist* (November 5, 1983), *The Wall Street Journal* (December 29, 1983), and *The New York Times* (June 15, 1983 and January 22, 1984).

[2] All but ten of the 64 firms in the current sample faced no future public disclosure requirements. These ten firms planned to have publicly-traded debt or preferred stock outstanding following the buyout, and thus were subject to some (reduced) future disclosure requirements.

The final section provides a brief summary of empirical results and compares these findings to those of other recent studies that employ the accrual methodology to test for systematic income manipulation.

THE ROLE OF ACCOUNTING NUMBERS IN NONARM'S-LENGTH ACQUISITIONS

Management buyouts are nonarm's-length acquisitions through which incumbent managers become the sole owners of a public corporation by purchasing all common stock held by outsiders. These buyouts are generally structured as mergers of the public corporation with a shell corporation that is wholly-owned by management, or as a sale of the public company's assets to a management-controlled corporation. Management buyouts in which the subsequent private company is highly leveraged (with debt commonly constituting some 85 to 90 percent of total assets) are known as leveraged buyouts. The latter transactions usually include equity participation by third-party investors who specialize in obtaining financing for leveraged buyouts. Outside stockholders typically receive cash for their stock in the public corporation, although they sometimes receive debt or preferred stock. In any case, managers (sometimes in conjunction with third-party investors) retain the sole right to continue as equity-holders. For some companies, the elimination of public stockholders can generate material cost savings via improved managerial incentives and monitoring arrangements, and through reductions in registration, listing, and other stockholder servicing expenditures [DeAngelo, DeAngelo, and Rice, 1984].

Critics of management buyouts, however, claim that these nonarm's-length acquisitions are so fraught with opportunities for insider-managers to undercompensate outside stockholders that they should be prohibited outright, or at least strictly regulated (see, e.g., Brudney and Chirelstein [1978] and Stein [1985]). These criticisms typically center on the potential for opportunistic managers to conceal favorable inside information about the firm's future prospects from outsiders. If successful, these managers could purchase the publicly-held shares at a price that does not fully reflect outside stockholders' share of these prospects. Managers stand to gain from a strategy of information suppression because a successful buyout typically enables them to avoid all future public disclosure requirements. Hence, outsiders have little future information with which to judge whether the former public stockholders received adequate compensation for their ownership interest in the corporation. For example, a recent *Fortune* article argues:

> If the insiders perceive a large difference between what they can get by breaking up the company, liquidating it, or redeploying the assets, they cook up an offer to buy back the company from the stockholders and "take it private." Their offer is more than the stock market price. But it is—by definition—substantially below what the investors believe the value of the company will be once they have it as a private fief [Stein, 1985, p. 169].

In some cases, competition from other potential purchasers helps ensure outside stockholders a fair price because it places a lower bound on the premium managers must pay to acquire the publicly-held shares. Such competition, however, is of limited effectiveness when managers hold pre-offer majority control (as they do in over one-third of sample firms), since these managers can effectively block another bid. In any case, public stockholders can litigate in attempts to obtain a higher price for their shares, and they are also protected by the scrutiny of the SEC, which regulates disclosure of going-private transactions. To reduce opposition from the SEC and to minimize costly court delays, managers have incentives to offer a premium that compares favorably to those paid in other acquisitions, and to structure the buyout to minimize the potential for (and appearance of) managerial self-dealing. As an empirical matter, managers who own a substantial share of the stock typically require approval of the buyout by a majority vote of the public stockholders. Managers often appoint a special committee of the firm's directors to negotiate on behalf of outside stockholders, and require separate approval by the outside directors. Finally, they virtually always engage an investment banker to express an independent opinion on the fairness of the proposed compensation.[3]

Investment bankers employ a variety of market- and accounting-based valuation approaches to evaluate whether the compensation offered in nonarm's-length acquisitions represents fair value for the publicly-held shares [Rosenbloom, 1981]. For example, bankers typically compare the magnitude of the above-market premium to that of average premiums paid in other (both arm's-length and nonarm's-length) acquisitions. Accounting-based valuation approaches place primary emphasis on earnings capitalization models in which the firm's per-share earnings are multiplied by an average price/earnings ratio derived from a sample of companies judged comparable to the one under study. Consistent with the emphasis investment bankers accord earnings-based valuation approaches, unanticipated earnings increases sometimes cause them to withdraw a prior fairness opinion so that managers must increase the buyout compensation to obtain a "clean" opinion.[4] Such compensation increases can have a substantial impact on managerial wealth since, for the typical cash buyout proposal in the current sample, a five percent offer price increase would require an incremental outlay of some $4.2 million for the publicly-held shares.

The role of accounting numbers, and especially accounting earnings realizations, is to provide alternative assessments of fair value in nonarm's-length acquisitions. Open market stock prices do not by themselves satisfy the judicial concept of fair value, in part because of the potential for insider-managers to control the flow of information to the capital market (see, e.g., Brudney and Chirelstein [1974] and Chazen [1981]).[5] As an empirical matter, managers pay an above-market premium in these buyouts, so that independent valuation experts do not rely exclusively on the market price as a measure of fair value. One possible economic explanation for the premium payment is that the joint gains from going private are shared by managers and outside stockholders. Because the cooperation of both groups is required to effect those gains, the premium ultimately paid is the outcome of a bilateral negotiation process. The magnitude of that premium depends on relative bargaining positions, which can be enhanced (or undercut) by the earnings managers report prior to and during the negotiations. For example, an earnings increase can generate an offer price increase via its effect on the investment banker's fairness opinion.

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[3] Disclosure of actions taken to mitigate the potential for managerial self-dealing in going-private transactions is required by Rule 13e-3 of the Securities Exchange Act (see SEC [1979]).

[4] For example, the investment banker withdrew his opinion on the Master's, Inc. management buyout because "a number of factors changed, including the financial condition and earnings of the company." Subsequently, "based in part on Hutton's (the banker's) position and on the litigation commenced against the Company and its directors, the Board of Directors decided to increase substantially the merger price" from $7.50 to $10.00 per share (proxy statement dated October 22, 1980).

[5] Yet another difficulty with open market stock prices as indicators of fair value is that, even should managers initially offer public stockholders their full share of the gains from going private, the probability the offer will succeed is not one. Hence, market prices will not reflect the full extent of public stockholders' gains from the proposed transaction.

Earnings are also used by the courts to assess fairness, should outside stockholders litigate, as they typically do in these buyouts [Borden, 1974; DeAngelo, DeAngelo, and Rice, 1984]. Public stockholders can either seek judicial valuation of their shares under state appraisal statutes, or they can seek to enjoin the buyout on grounds that the acquisition itself is unfair.[6] The courts serve as the ultimate adjudicators in disputes between managers and outside stockholders over the value of the corporate ownership interest held by outsiders. They accept a variety of appraisal methods and valuation evidence as relevant in nonarm's-length acquisitions, including historical earnings realizations, book values, and market prices [Banks, 1974; Brudney, 1978; and Fischel, 1983]. The courts view market prices as important, but by themselves inadequate, measures of fair value, and they have also been reluctant to accept discounted cash flow techniques.[7] Perceived limitations of market prices and cash flow estimates have led the courts to emphasize earnings-based assessments of fair value in nonarm's-length acquisitions.

The emphasis accorded accounting earnings by the courts and independent financial experts provides managers with incentives to understate reported earnings in attempts to reduce the buyout compensation. *Ceteris paribus*, income-reducing accounting techniques also reduce the firm's book value and, in many cases, its asset value as well, and thus can potentially lower alternative assessments of fair value based on these other accounting measures. Managers can select a variety of income-reducing accounting techniques subject, of course, to approval by the firm's independent auditor. For example, they can report upward-biased expense estimates, defer revenue recognition, accelerate expense recognition, take direct write-offs, overaccrue expected losses, expense items that they would otherwise capitalize, etc. Managers can also choose simply to delay profitable investments until after the acquisition. However, most firms face competition in the product market and, hence, their managers do not have unlimited ability to delay profitable projects because the gains from these projects can be appropriated by competitors. Moreover, even a monopolist forgoes profits by deferral, with an evident opportunity cost. Importantly, a decision to defer profitable projects does not preclude the choice of (or incentives to engage in) income-reducing accounting techniques as well, since the two decisions are not mutually exclusive.

Public stockholders will recognize that managers who propose these buyouts have incentives to understate earnings, and they may take actions to discover and punish such managerial opportunism. Managers' ability to underreport income is therefore constrained by public stockholders' ability to hire financial experts who can both detect any income manipulation and convince outsiders (e.g., the courts and the SEC) of its importance. It is also limited by the possibility that informed investors will take an equity position and oppose the buyout, since public stockholders as a group typically have veto power in nonarm's-length acquisitions. On the other hand, the stockholder voting mechanism suffers from a well-known free-rider problem (see, e.g., Easterbrook and Fischel [1983]), because each stockholder has reduced incentives to search for income manipulation when each assesses a small probability that his or her vote will affect the election outcome. In short, while several constraining forces limit managers' ability to understate earnings, they do not eliminate their incentives to do so when information production is costly (see, e.g., Barzel [1982]). Given these constraining forces, the extent to which managers who propose a buyout actually exercise their accounting discretion to reduce reported income is an empirical issue, the investigation of which constitutes the remainder of this paper.

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[6] These two options are, to some degree, substitutes and their relative attractiveness differs across states as well as potentially over time within a given jurisdiction. See Fischel [1983] for an economic analysis of the stockholder's appraisal right and Manning [1962] for the historical development of that right. The reliance on the appraisal remedy in nonarm's-length acquisitions will likely increase in response to a recent Delaware decision, *Weinberger v. UOP* [1983].

[7] In the recent *Weinberger v. UOP* case, the Delaware court indicated that "the Chancellor rejected the plaintiff's discounted cash flow method of valuing UOP's stock as not corresponding with 'either logic or the existing law.' " When it overturned this decision, the Supreme Court of Delaware explicitly recognized the discounted cash flow technique and thus, while it was not commonly used in the past, its future use may well increase.

An important *caveat* to the empirical sections that follow is that managers have incentives to conceal any deliberate earnings understatement, since greater payoffs obviously accrue to managers whose accounting manipulations go undetected by the parties that would be adversely affected by them. Consequently, among the set of feasible income-reducing accounting techniques, managers have incentives to select those whose use is less obvious to outsiders. Managers' incentives to shade accounting income in subtle ways can also hamper academic researchers who seek to observe a deliberate earnings understatement. On the other hand, academic researchers rely on large sample averages, and thus can potentially isolate systematic effects that characterize the aggregate, but which are not so evident to outsiders on a case-by-case basis. Nonetheless, research which seeks to observe a choice that managers have incentives to conceal seems less likely to reveal that choice than it would be absent those incentives.

SAMPLE SELECTION, DESCRIPTIVE STATISTICS, AND FINAL DISCLOSURE PRACTICES

Management buyout proposals were initially identified by direct inspection of every issue of *The Wall Street Journal* over the ten-year period 1973–1982. This initial sample represents a two-year extension of the 1973–1980 sample employed in DeAngelo, DeAngelo, and Rice [1984] and is limited to firms listed on the New York or American Stock Exchange. I narrowed the current sample to those management buyout proposals that resulted in a proxy statement mailing to stockholders as of July 1983, as evidenced by *Wall Street Journal* reports, a criterion which ensures that all sample proposals represent serious attempts to buy out public stockholders. This criterion also ensures that all sample bids meet the relatively uniform data and disclosure requirements for the proxy statement that describes the acquisition, which I obtained for each sample firm. The final sample consists of 64 firms whose managers proposed to go private during 1973-1982.

Of the 64 sample firms, 26 were listed on the New York Stock Exchange and 38 were listed on the American Stock Exchange at the time of initial proposal. Thirty-three of the 64 proposals were for

TABLE 1

DESCRIPTIVE STATISTICS FOR 64 MANAGEMENT BUYOUT PROPOSALS (1973–1982)[a]

Descriptive Statistic	*Mean*	*Median*
1. Total Revenues[b] (in $000's)	262,093	87,266
2. Total Assets[b] (in $000's)	212,748	70,825
3. Book Value of Long Term Debt to Total Assets[b]	.181	.145
4. Market Value to Net Tangible Book Value of Equity[b]	.937	.730
5. Number of Stockholders[c]	4,587	1,945
6. Pre-Offer Total Market Value of Common Equity[d] (in $000's)	69,977	19,722
7. Management's Pre-Offer Ownership Percentage of Common Stock[e]	36.9%	36.3%
8. Pre-Offer Market Value of Common Equity Held by Public Stockholders[d] (in $000's)	53,824	11,153
9. Ratio of Final Offer Price to Final Annual Earnings Per Share[b]	10.5	10.4

[a] Of the 64 sample firms, 26 firms were listed on the New York Stock Exchange, and 38 firms were listed on the American Stock Exchange at the time managers proposed the buyout.

[b] All accounting data are taken from proxy statements (61 cases) or annual reports (three cases) and are based on the latest audited annual figures. All market values are based on closing share prices on the last trading day prior to initial public announcement of the buyout proposal.

[c] As reported in the proxy statement or in *Moody's Manuals*.

[d] Market values are calculated based on closing share prices the day prior to initial public announcement of the proposal. The total market value of equity figures should be interpreted as a lower bound on total equity values, since they do not fully adjust for the possibility that substantial share blocks command a premium over the open market price because of their associated control rights.

[e] As reported in the proxy statement for management (non-public) participants in the buyout.

leveraged buyouts with third-party equity participants. In the remaining 31 transactions, only members of the incumbent management group would remain as equity-holders in the subsequent private company. The average time lag between proposal announcement and proxy date was five months (median, 4.5 months), and one month typically lapsed between the proxy date and the date the stockholder meeting was held. The distribution of proposal announcements over the sample period is:

1973–0 proposals
1974–5 proposals
1975–2 proposals
1976–4 proposals
1977–7 proposals
1978– 8 proposals
1979– 6 proposals
1980–10 proposals
1981– 7 proposals
1982–15 proposals

Table 1 reports that the average sample firm whose managers proposed to go private had total assets of $212.7 million, a number that would place it approximately 482nd in the 1982 Fortune 500 ranking of industrial corporations [*Fortune*, May 2, 1983]. The median firm had total assets of $70.8 million, a figure that is considerably less than the mean value, as are the medians for the other size measures reported in the table. For example, the average sample firm had total revenues of $262.1 million (median, $87.3 million), and 4,587 stockholders (median, 1,945 stockholders). Table 1 reports that the average total market value of equity was $70.0 million (median, $19.7 million). This number should be interpreted as a lower bound on total equity values, since substantial share blocks can command a control premium over open market prices (see, e.g., DeAngelo and DeAngelo [1985, Section 6]). As Table 1 reports, managers of the average sample firm owned 36.9 percent (median, 36.3 percent) of the firm's common stock at the time they proposed the buyout. Moreover, managers of 23 of the 64 companies held majority control at that time. These large stockholdings, if traded, might be exchanged at considerably more than the open market share prices I used to estimate total equity values.

While managers held almost 37 percent of the common stock in the average sample firm at the time they proposed the buyout, the market value of the publicly-held common stock was nonetheless nontrivial—$53.8 million for the average firm (median, $11.2 million), based on closing share prices on the last trading day before public announcement of the buyout proposal. The financial resources required to return the corporation to private ownership are considerably greater than these numbers alone indicate, however, since managers typically offer a cash premium of some 56 percent over preannouncement market prices in these buyouts (see DeAngelo, DeAngelo, and Rice [1984, Table 5]).[8] Prior to management's buyout proposal, the common stock of the average sample firm traded somewhat below its book value, with a market-to-book ratio of .937 (median, .730). With respect to financial leverage, the average sample firm had a relatively conservative debt-to-assets ratio of .181 (median, .145).

In the vast majority of sample proposals (58 of 64 proposals, or 90.6 percent of the sample), managers offered cash as compensation for the publicly-traded shares. For these 58 cash proposals, the table indicates an average price/earnings ratio of 10.5 (median, 10.4), based on the final offer price and the final annual earnings per share. The sample average P/E ratio can be used as a rough estimate of the effect that a given earnings change would have on total buyout compensation, when earnings capitalization models are used to estimate fair value. Specifically, one can assume that the sample average of firm-specific P/E ratios reported in Table 1 approximates the (exogenous) average rate at which investment bankers and the courts value earnings. Under this assumption, managers of the average sample firm with a P/E multiple of about ten (and who own 37 percent of the corporation's common stock) could potentially avoid some $6.3 million in additional compensation to outside stockholders if they could understate earnings by $1 million. In other words, a given earnings understatement can potentially have a substantially greater impact on total buyout compensation because of the P/E multiplier effect of earnings capitalization models.

While managers have incentives to understate earnings in attempts to lower the buyout compensation, their opportunities to do so are constrained by the extent to which their accounting decisions are monitored by outside stockholders and their agents. For example, managers' opportunities to understate earnings are constrained when the accounting numbers they report are audited by an independent public accountant. Managers have incentives to voluntarily supply audited final disclosures if the provision of audited data enables them to guarantee a minimum level of accounting manipulation, and therefore, lowers the buyout compensation. Managers can provide audited final disclosures by timing the transaction so that the requisite stockholder vote takes place following release of the annual report. Should the meeting be unavoidably delayed, e.g., by public stockholder litigation, managers can arrange for the final (interim) financial statements to be audited.

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[8] This premium measure understates the magnitude of the premium ultimately paid because it is based on initial offer prices that are often increased before the acquisition is consummated. For the current sample, the offer price initially announced to the public was increased (or the terms sweetened) in 26 of the 64 proposals (40.6 percent of the sample) and in no case was it decreased.

As an empirical matter, the final public disclosures of only five firms were audited, and these disclosures were all annual results subject, in any case, to routine annual audit. Importantly, managers of *none* of the 59 firms whose final public disclosures were interim data voluntarily arranged for those data to be audited for the benefit of outside stockholders, so that a full 92.2 percent of the sample provided unaudited final results. In contrast, managers of all but three of the 64 sample companies arranged for a fairness opinion from at least one investment banker, and they sometimes arranged for two such opinions. One potential explanation for the prevalence of fairness opinions over independent audits is that these buyouts engender managerial incentives to *understate* earnings, so that accountants' conservative bias reduces their usefulness as monitors in these non-arm's-length acquisitions. Whatever the explanation, the unaudited nature of the final accounting disclosures of over 90 percent of sample firms evidently leaves managers of sample companies with some scope to understate pre-acquisition earnings in attempts to reduce the buyout compensation.

FULL SAMPLE ACCRUAL TESTS AND RESULTS

This section reports empirical tests of the hypothesis that managers who propose to take a public corporation private systematically understate reported earnings in periods before the acquisition. The ideal experimental design would enable the researcher to observe the set of feasible accounting choices available to managers in order to assess whether their ultimate decisions resulted in lower income than would otherwise have been reported. Because researchers cannot directly observe the earnings number that would have been reported absent the exercise of management's accounting discretion, they must develop a proxy variable for that number. The resulting empirical tests, then, are joint tests of the hypothesis under consideration and of the appropriateness of the chosen proxy measure. Healy [1983, 1985] has developed an empirical approach that uses the firm's operating cash flows as a proxy for what earnings would have been, absent managerial income manipulation. Healy's methodology estimates the extent of such manipulation as the total accounting accrual in the period of interest, defined as the difference between reported earnings and operating cash flows in that period.

An important advantage of the accrual approach is that it can potentially reveal the subtle income-reducing techniques that managers have incentives to employ because such techniques are less subject to detection by outsiders. For example, accounting accruals reflect managerial decisions to write down assets, to recognize or defer revenues, and to capitalize or expense certain costs, such as repair expenditures. They also capture the effect of accounting estimates, changes in those estimates, and changes in accounting methods. As Healy [1983, pp. 48–50] points out, the accrual approach has several limitations, the most important of which is that the total accrual contains both a discretionary and a nondiscretionary component. Symbolically, the total accrual in a given period $t=1$, AC_1, consists of a discretionary accrual, DA_1, and a nondiscretionary accrual, NA_1:

$$AC_1=DA_1+NA_1 \qquad (1)$$

If NA_1 is "large" relative to AC_1, then the latter measure is a poor proxy for the extent of income manipulation in period $t=1$.

More to the point for the current

study, NA_1 might be both large and systematically *negative* for many companies, even absent systematic income manipulation. If so, then an empirical observation that $AC_1<0$ could generate an erroneous inference that managers had deliberately understated earnings, when the correct explanation is that total accruals normally contain a (material) negative nondiscretionary component. Two factors lead me to expect that total accruals are normally negative. First, a major component of total accruals is depreciation expense, which by itself implies a negative total accrual. Moreover, a significant portion of the total depreciation charge in a given period is probably nondiscretionary in that period (see also Kaplan [1985, p. 111]). Second, Healy [1983] reports an average total accrual of -2.01 percent of total assets for his sample of Fortune 250 firms over a roughly contemporaneous time period (1973–1980).[9] Healy's evidence provides an empirical basis for the expectation that, in a given period, the level of total accruals is normally negative, even absent systematic incentives to understate earnings. These two factors indicate the desirability of developing a (nonzero) benchmark for the "normal" or expected total accrual in periods before the management buyout.

For these reasons, I take the total accrual in the immediately prior period as a benchmark for what the current accrual would be, absent income manipulation, the extent of which I estimate by the *change* in total accruals. My approach is roughly analogous to that used in event studies that take a comparison period return as a benchmark for the normal return to a given security. In particular, I test whether the average value of the "abnormal" accrual

$$(AC_1-AC_0)=(DA_1-DA_0)+(NA_1-NA_0) \tag{2}$$

is significantly negative for my sample firms in periods before the buyout, a finding which I would interpret as evidence of a systematic earnings understatement. This interpretation rests on an assumption that the average change in nondiscretionary accruals, (NA_1-NA_0), is approximately zero, so that a significant average decrease in total accruals, (AC_1-AC_0), primarily reflects a significant average decrease in discretionary accruals, (DA_1-DA_0).

Total accruals were calculated as net income minus operating cash flows, which I derived by adjusting working capital from operations for changes in all current operating accounts (see Drtina and Largay [1985] for a discussion of computational difficulties with cash flow calculations). The major difference between my measure of total accruals and the one used by Healy [1983, p. 34] and Liberty and Zimmerman [1985] is that these authors approximated operating cash flows by adjusting net income for depreciation expense and the changes in inventory, accounts receivable and payable, income taxes payable, and deferred income taxes. According to Healy [1985, p. 95], the only difference between this latter measure and mine is the earnings impact of the equity method of accounting for intercorporate investments. I obtained the relevant accounting data from the 64 buyout proxy statements augmented, when necessary, by information obtained from other public documents (annual reports, forms 10K, 10Q, and/or *Moody's Manuals*). To calculate standardized accrual changes, I subtracted the year-earlier total accrual

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[9] For the average firm in the current sample, total accruals were -4.62 percent of total assets in the final year as a public company, -3.22 percent the year earlier, and -3.47 percent two years earlier. All are significantly negative. For the 59 firms that reported interim data as their final public disclosure, the final average quarterly accrual was -0.84 percent of total assets, which is not significantly different from zero.

TABLE 2

QUARTERLY AND ANNUAL ACCRUAL CHANGES (PANEL 1), EARNINGS CHANGES (PANEL 2), AND CASH FLOW CHANGES (PANEL 3) STANDARDIZED BY TOTAL ASSETS: 64 MANAGEMENT BUYOUT PROPOSALS (1973–1982)

	Quarterly Change Measures[a]	*Annual Change Measures*		
	Final Quarter From Year-Earlier Comparison Quarter (*1*)	*Final Year From Year Prior* (*2*)	*Year Prior From Two Years Prior* (*3*)	*Average of Final Two Years From Three Years Prior* (*4*)
1. *Accrual Changes:*				
mean	−0.0037	−0.0123	0.0074	−0.0028
median	−0.0106	−0.0077	−0.0136	−0.0181
#negative:#positive	30:23	36:28	39:25	38:26
t-statistic	−0.3628	−0.7025	0.3934	−0.1782
significance level for Wilcoxon signed-rank test[b]	0.2128	0.1737	0.4323	0.1216
2. *Earnings Changes:*				
mean	0.0043	0.0033	0.0123	0.0146
median	0.0048	0.0057	0.0033	0.0024
#negative:#positive	18:35	26:38	27:37	28:36
t-statistic	1.0616	0.7925	1.2001	1.4681
significance level for Wilcoxon signed-rank test[b]	0.0605	0.2099	0.4165	0.2742
3. *Cash Flow Changes:*				
mean	0.0080	0.0156	0.0049	0.0174
median	0.0123	0.0087	0.0230	0.0284
#negative:#positive	21:32	27:37	28:36	26:38
t-statistic	0.9078	0.8388	0.2513	1.1085
significance level for Wilcoxon signed-rank test[b]	0.2252	0.2655	0.7356	0.1333

[a] The quarterly data are for the 53 firms that both (i) reported unaudited quarterly data as their final public disclosure (59 firms), and (ii) provided sufficient accounting data in the proxy statement or in forms 10Q to enable calculation of operating cash flows for both the final quarter and the year-earlier comparison quarter.

[b] These significance levels are one-sided for the accrual change tests, and two-sided otherwise, since I advance no prediction about the direction of earnings and cash flow changes of sample companies before the buyout.

from the total accrual in the period of interest and divided the difference by total assets.[10]

Table 2 reports the resultant accrual changes (Panel 1), as well as earnings changes (Panel 2) and cash flow changes (Panel 3) for the 64 sample companies in selected periods before the proposed buyout of public stockholders. Since total accruals are defined as net income minus operating cash flows, accrual changes over a given period can be expressed as:

$$(AC_1 - AC_0) = (NI_1 - NI_0) - (CF_1 - CF_0) \tag{3}$$

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[10] I also standardized by total revenues and, in virtually all cases, the results do not change materially with the alternative deflator. (I point out the minor exceptions in the discussion below.) Additionally, I calculated standardized accrual changes by first deflating total accruals (by total assets and by total revenues) and then differencing. The results of this latter procedure do not differ materially from the results reported in the text.

where, for example, NI_0=net income at time $t=0$ and CF_1=operating cash flows at time $t=1$. Intuitively, a given change in reported earnings can be decomposed into two components: the (assumed exogenous) change in operating cash flows, and the (assumed endogenous) change in total accruals. The data in Table 2 include mean and median (unaudited) change measures for the final quarter as a public corporation (Column 1),[11] for the final year, which is the final audited disclosure (Column 2), and for the immediately prior year (Column 3). Table 2 also reports the number of negative and positive changes in each specified period, t-statistics for tests that the average change measure in each period is zero, and significance levels for nonparametric Wilcoxon signed-rank tests, since conventional test procedures reveal significant nonnormality in the data (see Lehmann [1975] and Shapiro, Wilk, and Chen [1968]).

Panel 1 of Table 2 contains the accrual change data to test the hypothesis that managers of sample firms systematically understated reported earnings before the buyout. While the final quarter and final year accrual changes are negative as predicted, neither change is significant under parametric or nonparametric tests. For example, the final quarter accrual change averages -0.37 percent of total assets, with an associated t-statistic of -0.3628, which is significant at the 0.3592 level. Similarly, the median final quarter accrual change of -1.06 percent of total assets is significant at the 0.2128 level under a Wilcoxon signed-rank test. The accrual change tests in Columns 1–3 of Table 2 take the total accrual of the immediately prior period as a benchmark for the "normal" accrual in a given period. This choice of benchmark could bias the tests against rejection of the null hypothesis due to timing problems of the sort discussed by Holthausen and Leftwich [1983, pp. 113–114]. Specifically, since I do not know how far in advance managers first contemplate a buyout, I cannot be certain that they did not understate the earnings of periods whose total accruals I take as a benchmark. If they did, then my benchmark accrual is "too low," and the change in total accruals will not reflect the full extent of managerial income manipulation.

As a response to this potential timing problem, I calculated an alternative accrual change measure that incorporates a benchmark from an earlier time period. Of course, while an earlier benchmark is less likely itself to be understated, its use can introduce noise if material structural changes have occurred in intervening periods. Column 4 of Table 2 reports this composite accrual change, defined as the difference between the average of the final two annual accruals and the annual accrual from three full years before the management buyout. Like all other accrual changes in Table 2, this composite accrual change is not statistically different from zero. This latter finding suggests that the insignificant results in Columns 1–3 are not simply due to the choice of the immediately adjacent period as a benchmark to estimate the normal accrual.[12] In sum, all accrual change measures are inconsistent with the joint hypothesis that managers of sample firms systematically understated reported earnings in the final three accounting periods before a management buyout, and that such understatement is appropriately measured by a statistically significant reduction in total accruals.[13]

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[11] Quarterly data are for the 53 sample firms that both reported interim data as their final public disclosure, and for which I could obtain complete year-earlier quarterly data. While I obtained year-earlier quarterly reports on form 10Q for all sample firms that did not report these data in the proxy statement, six of the reports did not contain sufficient information (the relevant balance sheets and/or a funds statement) to calculate operating cash flows for that period.

[12] One-half of the sample buyouts were proposed during the period 1980–1982, a fact which led a reviewer to suggest that these observations may not be cross-sectionally independent. Hence, I deleted the 1980–1982 observations and re-ran all tests, and all results remain statistically insignificant.

The overall picture that emerges from Table 2 is that all accrual changes, all earnings changes, and all cash flow changes are insignificantly different from zero in each of the three reporting periods before the management buyout. For example, Panel 2 indicates that final (unaudited) quarterly earnings of the average sample firm increased by 0.43 percent of total assets (median, 0.48 percent) from the year-earlier comparison quarter.[14] (The median increase is positive at the 0.0605 level under a Wilcoxon signed-rank test, although a *t*-test of the hypothesis that the mean increase is zero yields a significance level of only 0.2933.) The 0.43 percent average earnings increase can be decomposed into two components: an average cash flow increase of 0.80 percent (median, 1.23 percent), reported in Panel 3, and an average decrease in total accruals of −0.37 percent (median, −1.06 percent), reported in Panel 1. An intuitive explanation of these numbers is that, had total accruals remained literally unchanged, managers of the average sample firm would have reported an earnings increase of 0.80 percent of total assets in the firm's final quarter as a public corporation, rather than the 0.43 percent earnings increase they actually did report. Importantly, while the direction of the accrual change is negative as predicted, the magnitude of that change is not statistically significant.

The accrual change tests reported in Table 2 employ a firm-specific (rather than a cross-sectional) benchmark accrual because firms whose managers propose a buyout probably differ on important dimensions from firms whose managers find it advantageous to remain publicly traded. Since we currently lack a well-specified theory that explains *why* corporations are publicly traded or privately held, one cannot be sure what these dimensions are and, therefore, how to interpret any cross-sectional differences in the accruals of my sample and those of corporations that remained publicly traded. For this reason, my tests employ a firm-specific time series benchmark, and they are therefore conditioned on an assumption that nondiscretionary accruals did not change materially for sample firms in periods before the buyout (refer to equation 2 above). More specifically, my empirical result that the average value of equation 2 is approximately zero allows me to infer that the change in discretionary accruals, $(DA_1 - DA_0)$, is *not* systematically negative only if the change in nondiscretionary accruals, $(NA_1 - NA_0)$, is not systematically *positive* for my sample companies.

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[13] I also checked whether managers tended to change accounting methods in periods before the management buyout. The 64 sample firms made no voluntary accounting changes in the final quarter. Of the 20 voluntary changes they made in the final two years before the buyout, ten were changes to the LIFO method of inventory valuation, and the other ten consisted of six income-increasing and four income-decreasing accounting changes. Evidently, if there is a tendency toward income-decreasing accounting changes, it is associated with a switch to the LIFO method. However, the observed frequency of LIFO switches (28.6 percent of the total accounting changes in this two-year period) is not markedly different from the 27.3 percent reported for firms in *Accounting Trends and Techniques* over the sample period, 1973–1982.

[14] To check whether managers of sample firms tended to delay the release of positive earnings, I classified each firm's final public disclosure as "good" or "bad" news based on the sign of the earnings change, and as "early" or "late" relative to the earnings release date for the comparable reporting period the year prior. Fourteen of the 64 firms released final earnings numbers on the same date as the prior year, 30 reported late, and 20 reported early. There was literally no difference across the "early" and "late" disclosers, with 60 percent of each group reporting "good" news.

A reviewer raised the possibility that firms which go private may be "growth" companies that might recently have experienced a systematic increase in nondiscretionary accruals. As a theoretical matter, this is unlikely to be the case because managers who propose a buyout deliberately choose to *reduce* their firm's access to public capital markets. This choice seems an unlikely one for "growth" companies, since managers obviously face constraints on the personal wealth they are able (willing) to invest in the corporation. Rather, managers should find a buyout of public stockholders relatively attractive when they face a shrinkage of profitable future growth opportunities which, in turn, reduces the value of access to public capital markets. This logic would seem to imply, if anything, a reduction in the current level of nondiscretionary accruals which, if present empirically, would actually strengthen my inference that managers who proposed these buyouts did not systematically understate earnings.

As an empirical matter, a systematic increase in nondiscretionary accruals would likely be associated with some unspecified, material structural change for a large number of sample companies which, in turn, should engender an observable change in operating cash flows. Table 2, however, indicates that operating cash flows are essentially trendless in periods before the buyout. Another indication of a material structural shift would be a change in the average levels of accounts receivable and inventory. However, I find that accounts receivable increased, on average, by only 0.76 percent of total assets (t-statistic$=1.6051$), and that inventory increased by a trivial 0.01 percent (t-statistic$=0.0118$) in the year before the buyout. (While my sample and Healy's [1985] are not strictly comparable, the analogous averages for his sample are a 2.02 percent increase in accounts receivable and a 2.21 percent increase in inventory, calculated from data in his Table 3.) In short, my sample firms exhibit no indication of abnormal growth before the buyout, as measured by changes in operating cash flows, in accounts receivable, and in inventory. While there is both theoretical and empirical support for the assumption that nondiscretionary accruals did not increase systematically before the buyout, readers should nonetheless note that my inference that managers of sample firms did not systematically understate earnings is conditioned on that assumption.

ADDITIONAL ACCRUAL TESTS AND RESULTS

One possible reason that I find no evidence of a systematic reduction in total accruals before a management buyout is that managers of only a proper subset of sample firms have sufficient accounting discretion to understate earnings by significant amounts. If so, then a material number of zeroes are factored into the sample averages, and it becomes more difficult to detect an earnings understatement in the remaining firms. As a check on this possibility, I partitioned the sample based on proxy measures for the degree of *ex ante* managerial accounting discretion. The 23 management groups that held majority control before the buyout proposal should, other things equal, have the greatest discretion over their firm's reported income. In contrast, the 14 management groups that proposed a buyout during a hostile takeover attempt should have the least accounting discretion because of the imminent threat of an unfriendly acqui-

TABLE 3

QUARTERLY AND ANNUAL ACCRUAL CHANGES STANDARDIZED BY TOTAL ASSETS:
64 MANAGEMENT BUYOUT PROPOSALS (1973–1982)
PARTITIONED BY THE DEGREE OF EX ANTE MANAGERIAL ACCOUNTING DISCRETION

	Quarterly Accrual Changes	*Annual Accrual Changes*		
Sample Description (number of firms: number with quarterly data)	*From Year-Earlier Comparison Quarter (1)*	*Final Year From Year Prior (2)*	*Year Prior From Two Years Prior (3)*	*Average of Final Two Years From Three Years Prior (4)*
1. Public Firm is Majority Controlled by Management (23:20)				
mean accrual change	−0.0063	−0.0193	0.0501	0.0319
median accrual change	−0.0043	−0.0373	−0.0023	0.0038
#negative:#positive	10:10	14:9	12:11	11:12
t-statistic	−0.5138	−0.5816	1.1571	0.8714
significance level for Wilcoxon signed-rank test	0.3476	0.1335	0.1542	0.6704
2. Firm is Neither Majority Controlled Nor Currently Subject to Hostile Activity[a] (27:21)				
mean accrual change	−0.0027	−0.0021	−0.0120	−0.0156
median accrual change	−0.0106	0.0064	−0.0138	−0.0154
#negative:#positive	13:8	13:14	16:11	17:10
t-statistic	−0.1918	−0.0756	−0.5510	−0.9935
significance level for Wilcoxon signed-rank test	0.3133	0.5430	0.2944	0.1080
3. Firm is Currently the Subject of a Hostile Takeover Attempt[a] (14:12)				
mean accrual change	−0.0010	−0.0206	−0.0256	−0.0351
median accrual change	−0.0242	−0.0157	−0.0306	−0.0611
#negative:#positive	7:5	9:5	11:3	10:4
t-statistic	−0.0293	−0.7531	−1.4283[b]	−1.5407[c]
significance level for Wilcoxon signed-rank test	0.2782	0.1576	0.0660	0.0583

[a] The occurrence of a hostile takeover attempt within one year of proposal was determined by inspection of proxy statements, *The Wall Street Journal Index*, and, where necessary, of relevant articles cited therein.
[b] Significant at the 0.0884 level, one-tailed test.
[c] Significant at the 0.0737 level, one-tailed test.

sition (and the associated threat of managerial job loss). These latter managers probably viewed the opportunity to avoid hostile takeover by going private as more valuable than the potential to do so at lower cost (at the risk of their own jobs) by taking the time to understate earnings of the still-public company. The remaining 27 sample firms would seem to fit somewhere between these two extremes in terms of managerial accounting discretion.

Table 3 reports mean/median accrual change data for the sample partitioned by the degree of managerial discretion over the public corporation's reported income. None of the quarterly or annual accrual changes reported in the table for any of the three subsamples in any time period is statistically negative at the .05 level or better. For the 23 firms whose managers held pre-offer majority control, both the final quarter and final year (mean and median) accrual changes are negative as predicted, but insignificantly so. The Wilcoxon significance levels for these accrual changes, for example, are 0.3476 and 0.1335, respectively. Moreover, the accrual changes reported in Table 3 provide no evidence that greater *ex ante* managerial discretion is associated with a larger reduction in total accruals in periods before the buyout. In particular, since the accrual changes of the majority-controlled firms are not statistically negative when measured against a zero benchmark, they obviously cannot be more negative than the accrual changes of the other two subsamples, which are themselves negative numbers.

Table 3 reports that the two-year earlier accrual changes of the 14 sample firms whose managers proposed to go private during a hostile takeover attempt are negative at between the .05 and .10 significance levels (Column 3), as are the composite accrual changes for this subsample (Column 4).[15] One possible explanation is that some managers who propose a buyout deliberately underreport income by such a wide margin that they draw in a hostile bidder. This rationale, however, does not explain the insignificant accrual changes of the 23 majority-controlled firms, whose managers could deliberately understate earnings with no fear that such actions would attract a successful hostile bidder. A more plausible explanation is that the marginally negative accrual changes of the hostile takeover subsample are not directly related to the buyout itself. Evidence in support of this latter explanation is that these accrual changes preceded the buyout by at least two years and, for 12 of the 14 companies, announcement of the buyout *followed* announcement of the hostile takeover attempt. In short, the management buyout proposal may well have been a defensive response to a hostile acquisition attempt rather than an action managers had planned over a period of several years.

Managers of ten of the 64 sample firms faced some (reduced) public disclosure requirements in future periods because the newly-private company would have publicly-traded debt or preferred stock outstanding. Other things equal, these managers have fewer incentives to understate earnings because required future disclosures might reveal that they had used income-reducing accounting techniques before the buyout. Panel 1 of Table 4 reports the accrual changes for this subsample, which appear quite similar to those reported earlier for the full sample. For example, the mean accrual change in the final year before the management buyout is −1.75 percent of total assets (t-statistic = −0.6069) for the future disclosure subsample, versus −1.23 percent of total assets (t-statistic = −0.7025) for the full sample (from Table 2). These data provide no indication that greater future disclosure requirements are associated with a smaller reduction in total accruals in periods before a management buyout.

Panels 2–4 of Table 4 report accrual changes for three subsamples in which I expected managers to have relatively strong incentives to understate reported earnings. The data reveal that none of these accrual changes is significantly negative at the .05 level or better for any period reported in the table. For example, managers of 31 sample firms planned to be the sole residual claimants

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[15] These accrual changes become more significant when deflated by total revenues. Specifically, the mean (median) accrual change for this subsample two years before the buyout is −2.69 percent (−1.91 percent) of total revenues, which is negative at the 0.0396 (0.0450) level. Similarly, the mean (median) composite accrual change of −3.85 percent (−4.12 percent) of total revenues is negative at the 0.0223 (0.0258) level.

TABLE 4

QUARTERLY AND ANNUAL ACCRUAL CHANGES STANDARDIZED BY TOTAL ASSETS: VARIOUS SUBSAMPLE PARTITIONS OF 64 MANAGEMENT BUYOUT PROPOSALS (1973–1982)

	Quarterly Accrual Changes	*Annual Accrual Changes*		
Sample Description (number of firms: number with quarterly data)	*From Year-Earlier Comparison Quarter (1)*	*Final Year From Year Prior (2)*	*Year Prior From Two Years Prior (3)*	*Average of Final Two Years From Three Years Prior (4)*
1. Sample Firms Subject to Some (Reduced) Future Disclosure Requirements (10:9)				
mean accrual change	−0.0132	−0.0175	−0.0110	−0.0211
median accrual change	0.0047	−0.0045	−0.0439	−0.0512
#negative:#positive	4:5	6:4	7:3	7:3
t-statistic	−0.5872	−0.6069	−0.3378	−0.6837
significance level for Wilcoxon test	0.6389	0.3052	0.3418	0.1541
2. Buyouts with no Third-Party Equity Participation (31:25)				
mean accrual change	−0.0108	0.0179	0.0143	0.0184
median accrual change	−0.0008	0.0151	−0.0138	−0.0108
#negative:#positive	13:12	13:18	17:14	17:14
t-statistic	−0.8318	0.6389	0.4147	0.6379
significance level for Wilcoxon test	0.3433	0.7976	0.4416	0.3882
3. Sample Firms with "High" Price/Earnings Ratios[a] (32:24)				
mean accrual change	−0.0075	−0.0325	0.0112	−0.0115
median accrual change	−0.0200	−0.0097	−0.0128	−0.0137
#negative:#positive	15:9	18:14	20:12	21:11
t-statistic	−0.3971	−1.2031	0.3843	−0.4566
significance level for Wilcoxon test	0.1485	0.1370	0.4814	0.0763
4. Sample Firms Whose Managers Raised the Offer Price (26:24)				
mean accrual change	−0.0005	−0.0358	0.0243	0.0035
median accrual change	−0.0131	−0.0131	−0.0104	−0.0137
#negative:#positive	14:10	15:11	16:10	15:11
t-statistic	−0.0282	−1.5036[b]	0.9996	0.1585
significance level for Wilcoxon test	0.2695	0.1737	0.4697	0.3058

[a] This subsample contains those firms with price/earnings ratios greater than or equal to the full sample median. Price/earnings ratios were calculated using annual earnings per share in the year prior to the final annual disclosure and the average of high and low share prices for that calendar year.

[b] Significant at the 0.0726 level, one-tailed test.

of the newly-private company, while managers of the remaining 33 firms proposed to go private via a leveraged buyout with third-party equity participants. The former managers stand to gain more from a given earnings understatement, other things equal, because their corporate ownership interest is greater. Panel 2 of Table 4 reports accrual changes for the 31 firms whose buyout proposals included no third-party equity participation, none of which is significantly negative in any time period. These data provide no indication that managers who planned to be the sole residual claimants of the private corporation systematically understated earnings before the management buyout.

Other things equal, managers stand to gain more from a given earnings understatement when the courts and financial experts assess fair value by applying a relatively high price/earnings multiple to reported earnings per share. For this reason, I divided the sample in half based on the firm's price/earnings ratio, which serves as a rough proxy for the magnitude of the earnings capitalization model's multiplier effect on reported earnings. I calculated a P/E ratio for each firm from annual per-share earnings the year before the final audited disclosure and the average of high and low share prices for that calendar year. Panel 3 of Table 4 reports accrual changes for the 32 sample firms with "high" P/E ratios, none of which is significantly negative at the .05 level or better. The median composite accrual change in Column 4 is marginally negative, at the 0.0763 level, and becomes negative at the 0.0386 level when standardized by total revenues. While suggestive that accrual changes are somewhat more negative for the higher P/E firms,[16] these data provide no strong indication that managers of firms whose earnings are capitalized at a relatively high P/E multiple systematically understated reported income before the management buyout.

Finally, an increase in buyout compensation might be associated with a significant reduction in total accruals if some managers who deliberately understate earnings are discovered doing so by outsiders, and consequently are forced to raise the offer price. If such discoveries occur in a material number of cases, then the mean/median accrual changes of the 26 firms whose managers raised the buyout compensation should be significantly negative before the transaction. However, as Panel 4 of Table 4 reports, none of the accrual changes for this subsample is significantly negative at the .05 level or better in any period. While the final year average accrual change of −3.58 percent of total assets is negative at the 0.0726 level under a *t*-test, the significance level for the Wilcoxon test is only 0.1737. Overall, these data offer no indication that managers who raised the initial offer price also systematically understated reported earnings before the management buyout.

In sum, *none* of the mean/median accrual changes reported in Table 4 is significantly negative at the .05 level or better for any subsample in any time period. These results are entirely consistent with those for the full sample (Table 2) and for the sample partitioned by the degree of *ex ante* managerial accounting discretion (Table 3). I interpret this set of tests as constituting strong rejection of the joint hypothesis that managers who propose to take a public corporation private systematically understate that corporation's reported income, and that such understatement is appropriately measured by a statistically significant reduction in total accruals in periods before the management buyout of public stockholders.

CONCLUSIONS AND INTERPRETATION OF THE FINDINGS

This study investigated the accounting decisions made by managers of 64 New York and American Stock Exchange firms who proposed a management buyout of public stockholders during 1973–

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[16] This conjecture is not borne out by the data, however, since both a *t*-test and a Wilcoxon rank-sum test reveal no statistically significant differences in the accrual changes of the "high" and "low" P/E subsamples.

1982. These nonarm's-length acquisitions engender potentially severe managerial conflicts of interest because managers who have a fiduciary duty to negotiate fair value for the publicly-held shares are themselves the purchasers of those shares, and thus have a countervailing incentive to minimize the compensation paid. This conflict, and the possibility that insider-managers can conceal favorable information about the firm's future prospects from outsiders, has led the SEC and others to question whether public stockholders receive adequate compensation for their shares. Because managers pay an above-market premium in these buyouts, the courts and independent investment bankers do not rely exclusively on the market price as a measure of fair value, but rather devise alternative benchmarks against which to evaluate the buyout compensation. These benchmarks include earnings-based valuation approaches, so that managers can potentially lower the buyout compensation, and increase their personal wealth at outside stockholders' expense, by deliberately understating reported earnings.

The empirical evidence presented in this paper, however, does not support the joint hypothesis that managers of sample firms systematically understated earnings before the management buyout, and that such understatement is appropriately measured by a systematic reduction in total accruals. This finding stands in sharp contrast to those in Healy [1983, 1985] and DeAngelo [1985], each of whom used the accrual methodology and each of whom found evidence of income manipulation in a different setting. Healy, for example, concluded that managers whose compensation was tied to reported earnings tended to overstate (understate) earnings, depending on the relationship between pre-manipulation accounting income and the amounts necessary to earn a bonus. DeAngelo concluded that managers whose incumbency was threatened by a proxy contest tended to overstate earnings during the contest, while dissidents who won these contests tended to "take a bath" after they acquired control of the corporation.

The insignificant findings in the current paper are, however, similar to the accrual results in Liberty and Zimmerman [1985], who found no indication that managers of firms engaged in union negotiations systematically understated earnings in attempts to reduce wage concessions. One possible explanation for both sets of insignificant results is that the accrual methodology is simply not powerful enough to detect systematic income manipulation. This explanation seems unlikely, however, given the significant results reported by both Healy [1983, 1985] and DeAngelo [1985]. A second possibility is that accounting earnings realizations are an unimportant factor in union negotiations and management buyouts or, in the limit, simply irrelevant overall, as discussed in Holthausen and Leftwich [1983]. This latter explanation also seems implausible, at least in the current context, since the courts and independent financial experts apparently accord major emphasis to earnings-based valuation approaches in their assessments of fair value in nonarm's-length acquisitions.

Perhaps the most plausible explanation for the current findings is that, because managerial conflicts of interest are severe in these buyouts, public stockholders and their financial advisors invest resources to examine firms' financial statements for evidence of income-reducing accounting techniques. Such careful examination takes place regardless of whether those financial statements are audited or unaudited. Managers who propose to buy out public stockholders are therefore faced with the prospect of detailed scrutiny that could engender large personal wealth losses through allegations of fraud and federal securities law violations. Hence, they do not find it in their interest to systematically employ accounting techniques that materially reduce reported earnings. In other words, the reason that managers do not systematically understate earnings is not that earnings are unimportant; rather, it is because earnings are sufficiently important to attract careful scrutiny by the parties who would be adversely affected by a successful strategy of income manipulation.

This explanation may also fit the results in Liberty and Zimmerman [1985], since union leaders can suffer large direct wealth losses if their failure to discover earnings understatements results in a less valuable wage package for their constituents. Hence, they have correspondingly strong economic incentives to search financial statements for evidence of income-reducing accounting techniques. Members of compensation committees do not have direct economic incentives of the same magnitude [Healy, 1983, 1985], and the potential gains to managers from an increased bonus may simply be immaterial from the perspective of outside stockholders. Finally, while dissident stockholders apparently scrutinize financial statements of firms engaged in proxy contests [DeAngelo, 1985], any income manipulations they discover may be less likely to influence other stockholders because of especially great free-rider problems in stockholder voting. For example, dissidents may by unable to convince other stockholders that managers manipulated earnings because other stockholders recognize that dissidents have their own "ax to grind" in these contests. Whichever explanation proves to be the more descriptive, one inference stands out clearly: the evidence presented here does not support a theory of accounting choice in which managers who propose to buy out public stockholders both have substantial discretion over the public corporation's reported earnings and systematically exercise that discretion to their own advantage.

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Ivar Kreuger's Contribution to U.S. Financial Reporting

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ABSTRACT: The most widely-held securities in America (and also the world) during the 1920s were the stocks and bonds of Kreuger & Toll, Inc., a Swedish match conglomerate. The company was founded and headed by Ivar Kreuger. The reason Kreuger's securities were so popular was that they were sold in small denominations and paid high dividends. Dividends of over 20 percent annually were paid on both stocks and bonds. Unfortunately, these dividends were paid mostly out of capital, not profits. Kreuger was essentially operating a giant pyramid scheme, which was hidden from the investing public by Kreuger's insistence that financial statements not be audited. He preached a philosophy that secrecy was paramount to corporate success. The bankruptcy of the company in 1932 was the largest on record and resulted in numerous changes in financial reporting. Articles in magazines and newspapers kept Americans aware of the extent of the fraud scheme at the same time Congress was considering the passage of a federal securities law. Thus, the timing of the bankruptcy and the corresponding media coverage made it politically expedient to pass laws that would make it difficult for similar schemes to be successful in the future. Such laws were indeed passed, and the Congressional committee reports specifically refer to Kreuger. The hypothesis of this paper is that the Ivar Kreuger fraud contributed significantly to the passage of the securities acts.

THE most widely-held securities in America (and also the world) during the 1920s were the stocks and bonds of Kreuger & Toll, Inc., a Swedish match conglomerate [Shaplen, 1960, p. 128]. The company was founded and headed by Ivar Kreuger, who was generally known throughout the world as the "Match King." Kreuger's rise and fall spanned, and in a way synthesized, the years of boom and depression between 1918 and 1932. Because great quantities of Kreuger & Toll securities were issued, and the company was for the most part a gigantic fraud, the bankruptcy of the company in 1932 was the largest on record and resulted in numerous changes in financial reporting [Churchill, 1957, p. 263]. Surprisingly, Kreuger and Toll kept few financial accounting records despite the fact it was a multibillion-dollar international enterprise with 400 subsidiaries. The hypothesis of this study is that it was the downfall of the Kreuger empire that contributed significantly to the passage of the U.S. securities acts, the requirement of mandatory audits for listed companies, and a movement to-

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ward uniformity in accounting principles.

This article in no way attempts to judge the worthiness of the Securities Act of 1933; the only point is to emphasize that the bankruptcy of Ivar Kreuger contributed to the passage of the Act. In fact, the many empirical studies that have cast doubt on the benefits of the securities acts may indirectly lend credence to the hypothesis of this study—that passage was attributable to a political reaction to a single fraud rather than to an in-depth study of what would be beneficial. Indeed, Ivar Krueger, although called "the greatest swindler in all history" [*Stock Exchange Practices*, 1933, p. 1355; Josephson, 1972, p. 107], may have played the most prominent role in the development of accounting as we know it today. An analysis of the writings from the popular press and from Congressional hearings will be used to support the above hypothesis.

THE KREUGER SCHEME

Ivar Kreuger came to America in 1900, at the age of 20, and got his start in business working in a variety of cities [Marcosson, 1929, p. 233]. While working as a construction engineer in New York, he helped build the Macy's building and the Plaza and St. Regis Hotels. His next job was the building of the football stadium at Syracuse University ["Ivar Kreuger A Suicide . . . ," 1932, p. 22]. He later returned to his native Sweden, where he took over his father's (Ernst Kreuger) small match-making factory in 1913 [Marcosson, 1929, p. 234]. Also, at the time he returned to Sweden, Kreuger formed a construction engineering firm with Paul Toll. The match company was soon merged into Kreuger & Toll. Toll's only participation in Kreuger & Toll was in the legitimate operations of the engineering branch of the firm. Through a series of mergers and reorganizations, Ivar Kreuger eventually controlled the entire Swedish match industry. He then began to make inroads on the match business in Europe. Kreuger realized that the poverty of many governments after World War I provided a wonderful opportunity for capitalists with plenty of cash. Thus, Kreuger & Toll set out to make big loans (as much as $125 million per country) to governments in return for official match monopolies ["Reich Match . . . ," 1929, p. 4]. This scheme worked so successfully that by the end of 1930 Kreuger had complete monopolies in 14 countries and huge trading concessions in many others. Altogether, this amounted to 90 percent of the world's match production ["Other . . . ," 1930, p. 44]. Kreuger regularly emphasized to investors that the foreign loans were risk-free since they were secured by an excise tax on match sales—the proceeds of which went into a trust account at a Kreuger-owned bank until the loan and interest had been paid (Martyn, 1932, p. 3].

Before Kreuger could lend millions of dollars to foreign governments, he obviously had to obtain the cash from some source. One such source was the gullible American public. Many of the securities issued by Kreuger ended up in the hands of small investors. This was made easier by the fact that the securities were often issued in small denominations. Also, wealthier Americans found this investment to be a good tax avoidance scheme. Kreuger was able to minimize taxes for both his corporations and the shareholders by channeling all income, both real and supposed, through corporations based in tax-free countries ["Ivar Kreuger III," 1933, p. 74].

One reason for the popularity of Ivar Kreuger's securities was that such high dividends were paid regularly. Annual dividends of as high as 20 percent were paid on both stocks and (participating) bonds. Unfortunately, these dividends were mostly paid out of capital, not profits ["Man Who Trapped . . . ," 1933, p. 1]. Price Waterhouse later estimated that actual profits were only one and one-half percent of capital—and this was before deducting interest expense ["Kreuger Earnings . . . ," 1933, p. 31]. Ivar Kreuger was essentially operating a giant pyramid scheme [Callender, 1932, p. 2]. Neither the investing public nor financial analysts were aware of the extent of Kreuger's manipulations because corporate secrecy was practiced by many firms at that time. In fact, Kreuger often stated that all an investor needed to know was a company's dividend policy; nothing else mattered. Kreuger often told accountants, as well as bankers and other investors, that the key to success was "silence, more silence, and even more silence" [Marcosson, 1929, p. 238]. Thus, if an investment banker were to ask for an audited balance sheet, Kreuger would simply refuse to deal with that individual. Since Kreuger's securities paid such high dividends, no investment banker wanted to risk losing Kreuger & Toll securities [Debedts, 1964, p. 28]. Thus, billions of dollars worth of securities changed hands without reference to financial statements. As it came out during the Senate investigation, even the corporate directors never saw any financial statements. Neither did the directors attend directors' meetings ["Man Who . . . ," 1933, p. 13]. In Kreuger's defense, some amount of secrecy was needed. Since he was dealing with foreign kings and dictators about government monopolies and taxes on matches, some agreements had to be kept secret. Unfortunately, Kreuger used this need for some secrecy to his own advantage by fabricating stories to fit the situation [Austin, 1937, p. 6]. In fact, Kreuger apparently prepared by hand every financial statement his companies ever issued without reference to journals or ledgers ["The Kreuger Affair," 1932, p. 16]. He reputedly then told his few accountants to record the entries necessary to make the books correspond to the already prepared financial statements [Churchill, 1957, pp. 249–255].

Ivar Kreuger became known as the greatest financial genius in the world [Callender, 1932, p. 13]. He appeared on the cover of *Time* magazine during the week of the stock market crash in 1929 ["Business . . . ," 1929]. Major articles appeared in the *Saturday Evening Post* [Marcosson, 1929 and 1932] and *The Literary Digest* ["Other . . . , 1930]. He was an advisor to kings and presidents. He was a frequent visitor at the Hoover White House [Churchill, 1957, p. 207; "Kreuger Visits . . . ," 1932, p. 1]. After making a loan of $75 million to France and saving the country's currency, he was awarded the Grand Cross of the Legion of Honor, the French equivalent of knighthood [Callender, 1932, p. 13]. The money he passed out to foreign governments was often used for humanitarian purposes, which made him seem less like a financier than a benefactor. He was occasionally referred to as the "Savior of Europe," and sometimes as the "Savior of the World" [Churchill, 1957, p. 141]. He was a peacemaker for the League of Nations at the Hague, and was sometimes suggested as a candidate for the Nobel Peace Prize [Callender, 1932, p. 13]. In 1930, Kreuger and Franklin D. Roosevelt received honorary doctorates from Syracuse University ["Dr. Ivar Kreuger," 1930, p. 40]. And if his financial roles were not enough to keep Kreuger in the public eye, he was often seen in the company of film actress Greta Garbo, whom he had sponsored early in her career; the two were often romantically linked [Churchill, 1957, p. 183]. Thus America, and much of the world, was Kreuger-conscious.

KREUGER SECURITIES

Kreuger issued a great variety of securities. In addition to Kreuger & Toll common stock, stock was issued by many Kreuger & Toll subsidiaries. Ivar Kreuger controlled about 400 different corporations. The largest subsidiaries were the Swedish Match Company and the International Match Corporation. Some stock issues were quite original; their rights were unlike typical common stock rights. For example, in 1924, Kreuger issued the first of several "gimmick" securities. These were Class B shares. In contrast to Class A shares which had full voting rights, Class B shares represented one one-thousandth vote per share, but had the same face value and dividend rights ["Business and Finance," 1929, p. 46]. Thus, Kreuger was eventually able to control his billion-dollar empire with Class A shares of his own which totalled less than one percent of the outstanding shares. In 1927, Kreuger offered American investors $50 million of sinking fund convertible debentures (which were promptly oversubscribed). In 1928, he introduced the participating debenture. This was an unsecured bond that, in addition to paying a standard five percent rate of interest, would also pay additional interest if the company was profitable. These bonds sold in denominations as low as $5.

Even after the stock market crash in 1929, Kreuger & Toll securities sold well. At that time, Kreuger & Toll securities were listed on more stock exchanges and were more widely held than any other security in the world. The company at no time suspended dividend or interest payments. Of course, there is no reason why the onset of the Depression would have any effect on dividend payments since dividends had never been based on profits. Instead, Kreuger was operating a gigantic pyramid scheme where new financing had to be obtained constantly to pay interest and dividends on already outstanding securities. High dividend payments were necessary to ensure the continued sale of new securities. And the continued sale of new securities was necessary to make the dividend payments. It was a never-ending cycle. Eventually, the pyramid was bound to topple.

In addition to the many legitimate businesses of Kreuger & Toll, many shell corporations also existed only on paper. Supposedly, some of these shell corporations were formed in small European countries for the purpose of avoiding income taxes, while others were formed only to become a part of the fraud scheme [Churchill, 1957, p. 115–117; Stoneman, 1932, pp. 22–23]. Many of these nonexistent companies were quite profitable, at least on paper. Only through these shell corporations was Kreuger able to show sufficient profits to make high dividend payments.

The Depression accelerated the pyramid's topple. Less and less profit was earned from the legitimate parts of the businesses, and investors had little or no money for new stock and bond offerings. Thus Ivar Kreuger could no longer maintain his fraud. Seeing the end of his empire, Ivar Kreuger took his own life on March 12, 1932. Initially, people mourned his death. The New York *Daily Express* compared his death to that of Caesar. The *Economist* described his death as a Greek tragedy:

> By the death of Kreuger, the world has lost a man of great constructive intelligence and wide visions, who planned boldly, yet on a basis which

> seemed to be protected by carefully devised safeguards, and who for once seemed about to combine with the profits of private enterprise a real contribution to the welfare of nations [Barman, 1932, p. 238].

This saintly viewpoint was not to last. Within a month after his death, the Price Waterhouse auditors had begun to unravel the true state of affairs of Kreuger & Toll, Inc. Subsequently, it was found that nearly a quarter of a billion dollars in reported assets had never existed. Within two months after Kreuger's death, there were calls for legislation to stop future Kreuger-like frauds [Winkler, 1932].

The stock market impact of Kreuger's suicide was significant; on the Monday following Kreuger's death, the stock of Kreuger & Toll accounted for one-third of the New York Stock Exchange volume. The stock was selling for $5 per share on the day Kreuger died. The following Monday (March 14), the stock opened at 1-7/8 ["The Passing . . . ," 1932, p. 57]. Within weeks, it was selling for five cents per share, and ultimately sold for as little as three cents per share.

KREUGER'S ACCOUNTING PRINCIPLES

Retrospectively, some Swedish biographers of Kreuger argued that he was not a crook; he simply followed different accounting principles than did other companies [Shaplen, 1960, p. 95]. For one thing, the balance sheets of Kreuger's companies, which he made up himself, were heavily laden with intangible assets at a time when other companies rarely recorded intangibles. His balance sheets regularly showed monopoly rights as a major asset. For example, when it was discovered that Kreuger had forged $140 million of Italian bonds, the U.S. subsidiary, International Match Corporation, had to write off a $27 million intangible asset (being 1/6 of total assets) representing the rights to a match monopoly in Italy, which did not exist. Bribes to foreign officials were another intangible asset Kreuger frequently reported [Shaplen, 1960, p. 95].

One biographer stated:

> He was obviously aware that he was inflating his values, but it seems possible that this amoral and visionary man believed he was not doing anything terribly wrong or, at least, anything unrectifiable. And, considering the peculiar financial morality of the day, perhaps he was not very different from the genus speculans all around him [Shaplen, 1960, p. 97].

The above statement is perhaps supported by the following quotation attributed to Kreuger:

> You know, it's a curious thing how every period in history has its own gods, its own high priests and holy days. It's been true of politics and religion and war, and now it's true of economics. We've created something new. Instead of being fighting men, as in days of old, we're all in business, and we've chosen some new high priests and called them accountants. They too have a holy day —the 31st of December—on which we're supposed to confess. In olden times, the princes and everyone would go to confession because it was the thing to do, whether they believed or not. Today the world demands balance sheets, profit-and-loss statements once a year. But if you're really working on great ideas, you can't supply these on schedule and expose yourself to view. Yet you've got to tell the public something, and so long as it's satisfied and continues to have faith in you, it's really not important what you confess. The December ceremony isn't really a law of the gods—it's just something we've invented. All right, let's conform, but don't let's do it in a way that will spoil our plans. And some

> day people will realize that every balance sheet is wrong because it doesn't contain anything but figures. The real strengths and weaknesses of an enterprise lie in the plans [Shaplen, 1960, p. 98].

Those who invested in Kreuger & Toll securities were victimized not only by the scheme itself, but also by their own blind greed. Accounting and financial reporting as we know it today was then in its infancy. Investors based their decisions solely on dividend payments, the personal reputation of Ivar Kreuger, and the prestige of the brokerage firm which had underwritten the American securities, Lee, Higginson & Company ["Ivar Kreuger III," 1933, pp. 72–74]. As a consequence, innocent investors throughout the world lost hundreds of millions of dollars. Kreuger's dishonesty resulted in tragedy for thousands of investors and reaction to its disclosure was swift. The news of the Kreuger swindle preceded the passage of the first securities act by only a year (see the synchronological time line in Exhibit 1). Over 300 articles about Kreuger's fraud appeared in the *New York Times* during 1932 and 1933. Other newspapers in both large cities and small towns provided similar coverage. In addition, five books on Kreuger were published in English in 1932 and 1933 [Allen, 1932; Sparling, 1932; Stoneman, 1932; Georg, 1933; and Soloveytchik, 1933]. Congressional committee reports also mentioned the need to protect investors from people like Kreuger. Perhaps a great swindler such as Kreuger was necessary so that future investors could be protected from his type.

ACTIONS IN CONGRESS

The U.S. Congress first took note of the Kreuger scandal as early as April 18, 1932—just a few days after the issuance of the initial Price Waterhouse report. Representative LaGuardia of New York issued a scathing attack on the floor of the House against the system which permitted a swindle such as that perpetrated by Kreuger. His particular target was the New York Stock Exchange: "I say to all the holders of Kreuger bonds in this country that they could not have been swindled out of their money had it not been either for the carelessness, indifference or connivance of the New York Stock Exchange" [*Congressional Record,* April 18, 1932, p. 8399].

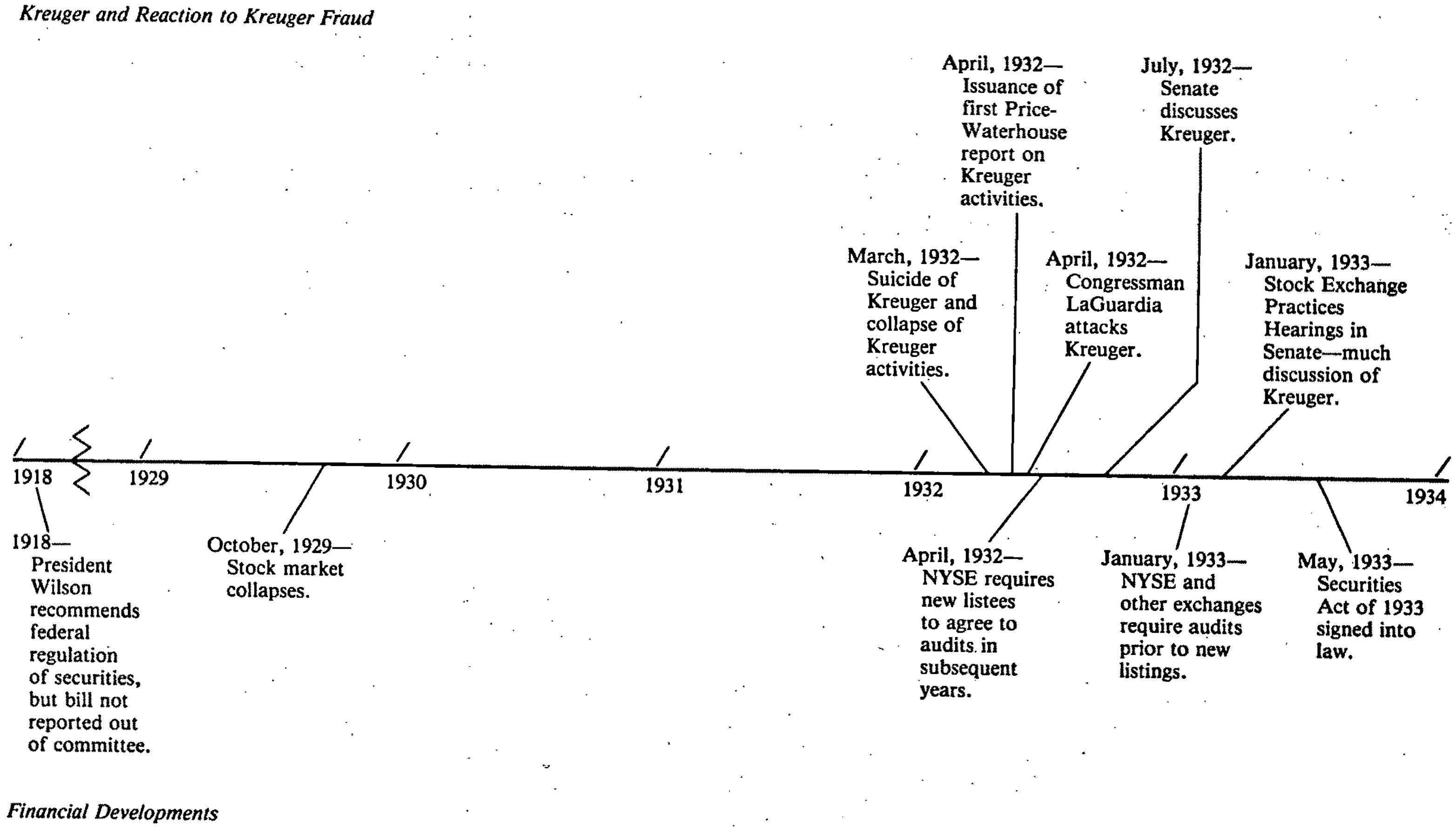
In July, 1932, a long discussion of the Kreuger case took place on the floor of the Senate, centered around a presentation by Senator George Norris of Nebraska, assisted by Senator Huey Long of Louisiana. Senator Norris began with a statement that "all the money taken by the publicly labeled scoundrels who peddle blue-sky securities, and on whom the better-business bureaus wage continual warfare, is but a drop in the bucket to the billions of dollars which have been lost to American investors and banks" because of Kreuger and his cohorts. Senator Norris concluded his formal presentation with this statement:

> It is only one of thousands, one of the big ones, it is true; but it is an illustration of what is going on all over the civilized world. It is an illustration of the deceit and trickery and the debauchery with which men of great wealth are trying to accumulate millions more of great wealth and to get it through the contribution of the pennies of the poor of every land under the sun [*Congressional Record,* July 13, 1932, p. 15201].

When the United States Senate first took up the subject of the pending securities law in 1933, the case of Kreuger & Toll was the first one discussed. The section of the committee report dealing with Kreuger is over 250 pages in length [*Stock Exchange Practices,* 1933]. The emphasis of the committee report was

EXHIBIT I

SYNCHRONOLOGICAL TIME LINE


Kreuger and Reaction to Kreuger Fraud
April, 1932— Issuance of first Price-Waterhouse report on Kreuger activities.
July, 1932— Senate discusses Kreuger.
March, 1932— Suicide of Kreuger and collapse of Kreuger activities.
April, 1932— Congressman LaGuardia attacks Kreuger.
January, 1933— Stock Exchange Practices Hearings in Senate—much discussion of Kreuger.
1918
1929
1930
1931
1932
1933
1934
1918— President Wilson recommends federal regulation of securities, but bill not reported out of committee.
October, 1929— Stock market collapses.
April, 1932— NYSE requires new listees to agree to audits in subsequent years.
January, 1933— NYSE and other exchanges require audits prior to new listings.
May, 1933— Securities Act of 1933 signed into law.
Financial Developments

the importance of secrecy to the success of Kreuger's fraud scheme. Senators supporting federal securities laws pointed out that there was no organization or individual to whom the investor could look for protection in a scheme such as that perpetrated by Kreuger. Even the directors of the company knew nothing of the fraud. In fact, the American director of Kreuger & Toll admitted on the witness stand that he had never attended a meeting of the board of directors, evidently having the view that the directorship would give him certain business advantages, but that he owed no obligation to the American investor [*Stock Exchange Practices,* 1933].

The Congressional committee spent some of its time discussing the laxity with which the New York Stock Exchange administered its listing agreement with Kreuger & Toll. It was noted that Kreuger & Toll agreed to keep the exchange advised of substitution of collateral on loans, but such substitutions were never reported even though in one instance the collateral on a $50 million issue was reduced by 90 percent.

The Senate's conclusion was that such lax reporting led to investor greed—and the subsequent downfall resulted in people losing not only their wealth, but their health as well. The remedies for such problems, according to Senator Norbeck, were as follows:

1. Simpler corporate structures and more straightforward accounting and auditing.
2. Better and more complete information about investments, cleaner publicity, more facts, and less bunk.
3. An obligation of personal liability for the accuracy of any facts stated in investment advertisements [*Congressional Record,* May 11, 1933, p. 3231].

Accountants who testified before Congress included A. D. Birning, of Ernst and Ernst, and George O. May, then with Price Waterhouse. Birning, the auditor for the International Match Corporation subsidiary, stated that he had repeatedly urged the directors of the International Match Corporation and representatives of the underwriting firm which processed Kreuger's securities (Lee, Higginson, & Co.) to permit his firm to audit the books of Kreuger & Toll. However, because Kreuger & Toll was the leading company in Sweden, the country did not relish having foreign accountants looking over the company's affairs. Birning was cited by members of the Senate committee as playing the principal role in the downfall of Ivar Kreuger. Birning had pursued Kreuger all over the world seeking the whereabouts of $50 million in German bonds which supposedly belonged to International Match. Kreuger kept giving Birning different answers—none of which could be confirmed by Birning. Birning's pursuance was believed to be the most pressing cause of Kreuger's suicide [*Stock Exchange Practices,* 1933, p. 1255].

George O. May was cited as having a dramatic flair as he emphasized the legerdemain Kreuger used in shuffling assets and the amazing confidence the man created among investors. For the benefit of the Congressional hearings, Price Waterhouse & Company made public a brief general statement summing up the firm's conclusions with respect to the Kreuger swindles. Price Waterhouse had been hired to conduct a thorough investigation of all of the Kreuger concerns and had previously issued 57 reports on the subject. The Price Waterhouse statement, which received considerable publicity, was as follows:

> The perpetration of frauds on so large a scale and over so long a period

> would have been impossible but for (1) the confidence which Kreuger succeeded in inspiring, (2) the acceptance of his claim that complete secrecy in relation to vitally important transactions was essential to the success of his projects, (3) the autocratic powers which were conferred upon him, and (4) the loyalty or unquestioning obedience of officials, who were evidently selected with great care, having regard to the parts which Kreuger intended them to take in the execution of his plans.
>
> Enterprises in which complete secrecy on the part of the chief executive officer as to the way in which important parts of the capital are employed is, or is alleged to be, essential to success, are fundamentally unsuited for public investment, since such secrecy undermines all ordinary safeguards and affords to the dishonest executive unequaled opportunities for the perpetuation and concealment of frauds ["Why the . . . ," 1933, p. 40].

Another influential individual testifying was Frank Altschul, chairman of the New York Stock Exchange Committee on Stock List, who stated that even the wisest members of the New York Stock Exchange had been fooled by Kreuger. As a direct result of Kreuger's swindle, the New York Stock Exchange was already (early 1933) requiring independent audits of the reports of all new applicants for listing [*Stock Exchange Practices,* 1933, p. 1357; May, 1936, p. 145]. Altschul also stated that he thought the Exchange would soon require audits of all companies listed on the Exchange. Both Altschul and the senators were in agreement that independent audited reports should be required of all public companies because investor confidence had been so shaken by the Kreuger affair [*Stock Exchange Practices,* 1933, p. 1357]. The safeguard provided by periodic audits was universally applauded by newspaper editors. The New York *Daily Mirror* stated that "gigantic swindles like the Kreuger & Toll Concern could not be organized" if regular audits were required. The Philadelphia *Record* urged Congress to require audits which would be expected to result in greater publicity and uniformity in corporate accounting ["Why the House . . . ," 1933, p. 40].

George O. May even emphasized to Congress the benefits of mandatory audits:

> That is one of the good things that I think has come out of this. That people have realized that, however trustworthy people may seem to be, some objective study is eminently desirable. In fact, the whole advance of accounting in this country is marked by a series of events like this. . . . Now they have come to find that, even though it may be only one case out of a hundred, it may sometimes be a valuable additional protection [*Stock Exchange Practices,* 1933, p. 1273].

May apparently, however, wanted to keep legislation at a minimum—perhaps thinking the New York Stock Exchange requirement was sufficient—as he warned against too much legislation:

> Of course, all these things are a question of balancing risks against costs. If you create a machinery of protection that is unduly expensive, you kill industry and you put a burden on new financing that is out of proportion to its value [*Stock Exchange Practices,* 1933, p. 1274].

Of course, May had been speaking out against federal regulation of accounting since at least as early as the publication of the Ripley article in *The Atlantic Monthly* in 1926 [Zeff, 1984, p. 451]. A warning that legislation should be kept to a minimum was in reality a reversal of May's longstanding advocacy of no legislation at all limiting accounting. This reversal could probably be attributed to May's fear of Congressional overreaction to the Kreuger fraud.

While Altschul was testifying, he broached a new subject that had not been considered by the Senate—the uniformity of accounting principles.

> Now may I at this point develop along another line which I do not think has come to your attention by way of illustrating the activities of the exchange in these matters. We have been laying so much emphasis in recent years on the obtaining of independent audited statements that we have begun to wonder whether an independent audited statement, which may mean so much and may mean so little, would not in itself become ultimately a matter that would involve further deception of the public. We have been having, therefore, a series of meetings and conferences with accountants with a view to seeing whether as long as the public is going to be asked to place so much reliance on the statements of independent auditors, if we can not get some agreements in cooperation with the accountants in regard to some of the general governing principles of accounting and in regard to accounting practice.
>
> An auditor's certificate—and I am not speaking as an auditor now, or qualified to speak as an auditor—but an auditor's certificate may be perfectly true as representing the condition of the books, but there are so many different kinds of ways in which the books themselves can be kept, that unless you have got some standardized practice that goes beyond the mere certificate, the chances of deceit are still inherent in the situation [*Stock Exchange Practices,* 1933, p. 1358].

At this point, Altschul submitted a preliminary report of the meetings between the New York Stock Exchange and the American Institute of Accountants, which was entitled "Value and Limitation of Corporate Accounts and General Principles for Preparation of Reports to Stockholders" [*Stock Exchange Practices,* 1933, p. 1358]. The report was subsequently issued, without change, by the American Institute under the title *Audits of Corporate Accounts.*

OTHER POSSIBLE INFLUENCES

Some might argue that other bankruptcies of the early 1930s, particularly that of the Insull companies, were equally important in motivating Congress to act with respect to securities legislation. They certainly would have added fuel to the fire. Indeed, a reading of President Franklin Roosevelt's pleas for securities regulation would lead one to believe that Insull and Kreuger were equally guilty with respect to defrauding the public [Roosevelt, 1938, p. 93]. Similarly, Felix Frankfurter, counsel to the House committee which considered the securities bill, in an article defending passage of the securities act, attributed passage to both Kreuger and Insull [Frankfurter, 1933]. Contrary to these political utterances, however, the case for Insull is not as strong as that for Kreuger. No other case received as much publicity and was as large in terms of dollar losses as was Kreuger & Toll. Kreuger was a legend on Wall Street and throughout the world. Kreuger had defrauded—through misstated balance sheets and income statements—hundreds of thousands of individual investors, numerous university endowment funds, and hundreds of banks ["Ivar Kreuger III," 1933, p. 70]. Indeed, the list of banks suffering losses at the hands of Kreuger includes several in nearly every state of the union.

Alternatively, Insull was guilty of nothing more than participating in a few wash sales in the last days when the Depression was toppling his empire (a practice that was not illegal). Although Insull was tried on a variety of charges, he was subsequently acquitted of all wrongdoing ["Insull Acquitted with . . . ," 1934; "Insull Acquitted on . . . ," 1935; "Last Court . . . ," 1935]. In contrast to the five books published on Kreuger, the *Cumulative Book Index* for 1928 to 1937 showed none dealing with the subject of Insull until 1937 [Ramsay, 1937]. Insull simply was not as newsworthy as Kreuger. In addition, Insull operated out of Chicago and investors who lost money were primarily located in Indiana, Illinois, and Wisconsin [McDonald, 1962, pp. 203-204]. Insull avoided Wall Street and New York bankers because of disputes he had with them while he was Thomas Edison's secretary prior to the turn of the century [McDonald, 1962, p. 39 and p. 204]. Also, Insull's entire empire did not crumble at the same time. Small companies would periodically announce bankruptcy; some Insull companies never succumbed to bankruptcy; and for some that did, Insull was the court-appointed receiver ["Expect Dawes . . . ," 1932, p. 31]. Not only was Insull not viewed in the same light as Kreuger, but the former was even awarded a pension of $18,000 annually by one of his companies when it became known that he was penniless after the downfall of his companies [*Congressional Record,* July 13, 1932, p. 15201; "Collateral of. . . ," 1933; "Insull Pension . . . ," 1935]. Thus, Insull was viewed more sympathetically than Kreuger.

Even George O. May emphasized the difference between Kreuger and Insull during the Senate hearings. When asked to compare the two, May stated that although Insull's holdings might be difficult to unravel, no secrecy was involved. Kreuger "is quite a different phenomenon, to my mind. This is an absolutely unique case, and I think for that reason there is danger in legislating for it because I do not suppose there has been anything to compare with it since the South Sea Bubble" [*Stock Exchange Practices,* 1933, p. 1271].

In a January 16, 1933, letter to all Price Waterhouse partners on the recent action of the New York Stock Exchange and the New York Curb Exchange to require mandatory audits, George O. May called the requirement an important step in the development of financial auditing. May then mentioned the Kreuger case as having led to these developments [May, 1936, p. 145].

The public may have blamed the nation's financial ills on the stock market crash and the Depression.

> The public in the first year or two after the great crash had participated in the early tendency to diagnose "speculation" as the cause of the nation's financial ills. In later years it had, however, found room for increasing doubt that speculations furnished the chief cause for the mountainous public losses in investments. The collapse of such financial structures as those of Insull and Kreuger revealed a callous exploitation of the investor, whose financial support had been so earnestly solicited [Debedts, 1964, pp. 27-28].

Congress apparently shared this view, for otherwise it would have taken up the subject of securities laws sooner than three years after the stock market crash. Congress had indeed considered securities laws at an earlier date. President Wilson had recommended federal regulation in 1918, but the bill was not reported out of committee. The bill that actually formed the basis for the 1933 Securities Act had been floating around Congress since 1920 [Edwards, 1939, p. 312]. Also, it would have been difficult to legislate against the speculation that occurred during the 1920s. Indeed, the securities laws and the requirement by the New York Stock Exchange for mandatory audits came about to restore confidence in the system. A single event—the corruption of Ivar Kreuger—had shaken investors' confidence and provided the media event of the age. As so often is the case with media events, Congress felt it had to act, and act it did. This action was not a reaction to the Depression, but a reaction to criminal activity. Thus, America's securities laws were a product of the speculation of the 1920s and the Depression only to the extent that Ivar Kreuger was a product of that era. Of course, Kreuger's ambitions were greatly assisted by the times in which he lived.

Interestingly, one researcher in 1939 concluded that the Kreuger securities issues could not have been prevented or the investment bankers punished under the Securities Act because Kreuger's prospectuses were usually truthful with respect to the unfavorable terms of the particular issue [Edwards, 1939, p. 312]. Edwards therefore concluded that the 1933 Act was based on questionable premises, since the major losses were not caused by the investing public receiving fraudulent and inaccurate information. Instead, losses were caused by unsound trends in finance. Even though Congress stated that the Securities Act was passed "to prevent a recurrence of these gross frauds" [*Congressional Record,* May 4, 1933, p. 2], Edwards found very few cases of fraud ever having been proved in courts. In fact, only one fraud case (Kreuger) involved New York Stock Exchange listed securities.

ADDITIONAL IMPLICATIONS

Aside from being an interesting historical tidbit, the story of Ivar Kreuger also offers some food for thought concerning present-day activities. It seems that some of Kreuger's techniques are practiced to this day, audit requirements notwithstanding. Some specifically mentioned by one accountant are:

1. Should the issuance of gimmick securities, specifically non-voting shares, result in delisting? This is presently a hot issue for the New York Stock Exchange.
2. Secrecy continues to be advanced as an alibi for nondisclosure of important information. Secrecy is also practiced on an epic scale abroad, especially in the Arab Emirates; pyramid schemes helped to bring down Kuwait's unofficial stock market in 1982.
3. The application of such auditing procedures as inventory test counts and confirmations on a transnational basis continues to be a contentious issue.
4. The issue of shell companies, involving consolidation criteria, continues to be controversial. Furthermore, should sidelines such as banking be consolidated?
5. The role of directors continues to be largely meaningless [Pomeranz, 1985].

Perhaps the Kreuger saga does nothing to answer the above problems, but a reminder of Kreuger's activities certainly indicates the magnitude that such problems can take on if not addressed soon.

CONCLUSION

The final audit report showed that Kreuger & Toll had somehow dissipated about three-quarters of a billion dollars over the years, and a third of this amount could not even be explained by the auditors ["The House . . . ," 1945, p. 88]. Of this sum, Ivar Kreuger had stolen and spent over one hundred million dollars ["The Kreuger Case Again," 1933, p. 284]. Both widows and influential bankers were among the ones to suffer the loss. As a result, the U.S. Congress was influenced to pass laws in an attempt to avoid similar occurrences in the future. Similarly, the New York Stock Exchange issued rules requiring mandatory audits of listed companies. Even a movement toward uniformity in accounting principles can at least partially be laid at the feet of Kreuger.

Perhaps it is only speculation that Kreuger's fraud led to the passage of America's securities acts. However, the timing was certainly right—and Kreuger's scheme was thoroughly discussed in Congress. Moreover, the popular press devoted untold space to Kreuger's fraud throughout 1932 and 1933. Consequently, the general public was widely aware of what Kreuger had perpetrated. Thus, the passage of securities laws became a politically expedient thing to do. No longer was the protection of stock-market investors of importance only to the rich and powerful. Kreuger had defrauded the little man, and the hue and cry was raised throughout the land that investors must be protected from future repeats by similar demons.

Throughout the 1920s, Kreuger was viewed as a financial genius and capitalist humanitarian. Upon his death, he was viewed as a victim of the Depression. By March, 1933, Kreuger was perhaps being viewed in a manner leading to the hypothesis of this study:

> As it now turns out, the only service he unconsciously performed for the world was to open its eyes through his death to the shortcomings of the present economic system [Olson, 1933, p. 2].

The above article went on to state that "unfortunately the world seems to have failed to understand the significance of Kreuger's death and failed to grasp that his end meant the end of an epoch" [Olson, 1933, p. 2].

By 1937, if the following quotation is any indication, Ivar Kreuger was finally being recognized for his real contribution to society:

> From the record of falsehood and betrayal with which Kreuger besmirched the very pillars of finance in the leading countries of the world has come, particularly in the United States, the erection of new safeguards for investors. In our Securities Act are to be found preventives whose origin is to be traced definitely to the Kreuger experiences [Austin, 1937, p. 6].

Ivar Kreuger pulled off the largest fraud in history, but perhaps a person of his ilk was needed in order to bring about improved financial reporting. Indeed, Ivar Kreuger may have, indirectly, done more good than harm for the financial community, and a reminder of his activities could still provide direction for the future.

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User Primacy in Corporate Financial Reporting: A Social Contract Approach

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ABSTRACT: According to the principle of user primacy, the interests of users of financial reports take priority over the interests of preparers of financial reports. When applied to the activities of a standard setter for corporate financial reporting, user primacy is a constitutional claim, stating a general principle for the resolution of conflicts. It is controversial, because it is incompatible with views that standard setting is a collective choice process, where the interests (preferences) of all parties are to count equally. An analysis of the logical foundations of the principle is provided, based on recent work in ethics and social and political philosophy. User primacy is a distributional principle governing the relationship between users and managers. A theoretical framework for the rational choice of a distributional principle governing the disclosure of information in the securities market is provided. The conditions under which a securities market—which includes in its basic structure a standard setter to implement the user primacy principle—would be chosen by rational, disinterested securities market agents are analyzed. A standard setter would be established to enforce user primacy, thereby redressing an imbalance between investors (users) and managers. By acting in accordance with this principle, the standard setter aids all securities market agents in exploiting the potential trading gains provided by such a market. At the same time, investors are protected from possible losses arising from the basic relationship between them and managers of widely held corporations. The analysis is applied to two versions of the user primacy principle prominent in the professional standard-setting literature. Although the analysis is not intended to advocate user primacy, a clear and complete statement of the principle is proposed as a guide to standard-setting bodies.

TRADITIONALLY, the job of a standard-setting body for corporate financial reporting was viewed as the codification and recommendation of "the best" practices. More recently, it has been recognized that publicly reported financial information presents difficult collective choice problems that affect the allocation of resources to the production and consumption of such information. The collective choice aspects of financial reporting are the unavoidable result of the existence of conflicting individual interests. Several complementary

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conceptions of the role of a standard setter, some or all of which may be operative, follow from this.[1]

Distributional problems are also present in corporate financial reporting. Suppose that a standard-setting body were established to resolve allocational problems. Then,

> every policy choice represents a tradeoff among differing individual preferences, and possibly among alternative consequences, regardless of whether the policy-makers see it that way or not. In this sense, accounting policy choices can never be neutral. There is someone who is granted his preference, and someone who is not. The ethical question is what morality should guide the policy-making process? [AAA, 1977, p. 24f; see also Beaver and Demski, 1974, and May and Sundem, 1976, p. 750].

Any centralized resolution of a collective choice problem should be expected to have distributional effects [Mueller, 1979]. Beaver and Demski pointed out and emphasized the importance of "the fundamentally ethical question of how preferences should be weighted across individuals in determining financial reporting policies" [1974, p. 184]. There have been no substantial attempts to examine further this critically important and controversial issue.

Two basically different kinds of distributional principles governing a standard setter's decisions have been advanced in the accounting literature. According to one, all affected parties are to be treated equally by the standard setter. That is, information about the interests of all individuals is to count equally as input to the standard setter in resolving the collective choice problem.[2] The rationale for this general principle of neutrality is that the goal of the standard setter would be to select standards which maximize social welfare, regardless of the distribution of costs and benefits across the population. According to the other kind of principle, some subset of the population affected by financial accounting and reporting standards would be given preferential treatment. Such a group would have a claim to the content of financial reporting standards which is prior to the claims of other groups. Clearly, any such general principles must be rationalized on some grounds other than the efficiency of specific outcomes.

This paper is a critical examination of the theoretical foundations of one principle of the latter type, the user primacy principle. This principle calls for a systematic bias in financial reporting in favor of those users of financial information who are in a disadvantageous position with regard to the production and consumption of financial informa-

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[1] The standard setter may exist: (a) to correct market failures by promulgating standards which result in the provision of the optimal amount of the public good [Gonedes, and Dopuch, 1974; May and Sundem, 1976]; (b) to produce actions which are collectively rational, but which may not be performed by individuals acting independently [Aivazian and Callen, 1983]; (c) to economize on contracting costs between firms and investors and creditors, by establishing conventions of accounting and reporting [Ng, 1978]; (d) to promulgate standards that are in the interest of some economically or politically powerful group, possibly at the expense of weaker groups [Jensen, 1976; Watts, 1977; Watts and Zimmerman, 1979].

[2] Standard setting could proceed in either of two ways to aggregate individuals' preference equally. If it is organized as a voting system, than each individual's preferences could either be assigned equal weight or weighted unequally (e.g., by size of ownership claim) as a vote on specific issues. Alternatively, the standard setter could attempt to measure the expected costs and benefits to all individuals and promulgate a standard which maximizes the aggregate net benefits.

tion [Beaver and Demski, 1974, p. 178]. The analysis focuses specifically on the relationship between the managers of widely held corporations, and actual and potential investors.[3]

The analysis shows that securities market agents would, under specified conditions, freely agree on user primacy as the distributional principle governing the production of financial information. Although it is not intended to advocate user primacy, the principle does follow from the analysis under the most plausible initial conditions. Since acting in accordance with the principle typically would impose an opportunity cost on managers, some enforcement mechanism is called for. Therefore, investors and managers would agree to have a third party (the standard setter) adjudicate conflicting views regarding the specific disclosures to be made. In this context, user primacy is a statement about the role of the standard-setting body. According to the principle, the standard setter should promulgate standards which are in the interest of investors. In this way, securities market agents can exploit the potential gains yielded by a securities market in making financing and investment choices, while at the same time protecting investors against certain kinds of losses (by putting constraints on the actions of managers) [McClennen, 1982].

The problem of the existence and role of a standard setter is regarded as a constitutional problem, relating to the basic structure of an important social institution.[4] Securities market agents are bound by a kind of "social contract." A right exists when there is good reason to acknowledge an obligation to provide the bearer of the right with those things to which he or she is claimed to have a right. Furthermore, rights must involve some enforcement procedure.[5] Thus, this paper provides an analysis of the conditions under which investors may be said to have a right to financial information.

Section 2 is a brief review of the philosophical basis for the analysis of the rational foundations of the user primacy principle. Section 3 presents two different versions of the user primacy principle that have been advocated as principles governing standard setters and provides an ethical foundation for them. Section 4 examines some of the implications of the foregoing analysis for standard setting. Section 5 contains a summary and conclusions.

PHILOSOPHICAL BACKGROUND

The philosophical literature on social choice and distributional issues is immense. A brief account of the most relevant recent developments provides a general background against which the theoretical foundations of the user primacy principle may be examined.

Ethics and Decision-Making

The prevailing modern view is that ethics and economics are both parts of the general theory of rational decision-making. Ethics is concerned, among other things, with providing a theory of rationality, i.e., a basis for choosing among competing courses of action. Choice situations in which individuals have conflicting interests are particularly important because, in general, not every individual's interests can be completely satisfied [Baier, 1965, p. x–xviii]. Laws, judicial decisions, and regulations promulgated by a central regulatory agency all perform the function of restricting the freedom of individuals to act in specific ways by constraining the range of actions open to them. The user primacy principle and the neutrality principle are thus competing ethical principles, describing how conflicting interests are to be satisfied.

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[3] The analysis is in terms of the structure of the securities market. Investors and managers of widely held corporations interact also in the managerial labor market. Since their interests conflict in the latter market in the same way as in the former, the analysis applies to the managerial labor market as well. Including both would complicate the analysis without changing the result.

[4] Accordingly, the standard-setting process would be considered part of the infrastructure of the securities market itself, just as are specialists, rules against insider trading, and laws against fraud. *Ipso facto*, the standard-setting institution is not an interference in the securities market, preventing participants from making direct, voluntary (market) determinations of financial reporting practices. Rather, it serves at a more fundamental level to create a more nearly ideal securities market (at some cost) by reducing information asymmetries.

[5] See Narveson [1984] for a more complete analysis of the existence of rights.

Choice Behind a Veil of Ignorance

The key to the arguments given below for rationalizing the user primacy principle is the postulation of a *representative* securities market agent who is to decide on the basic structure of that market. This is done by defining a hypothetical situation of uncertainty in which securities market agents are uncertain about their own position (i.e., as manager or investor) in the market. In Rawls's [1971] terminology, decision makers are thus forced to make decisions from behind a "veil of ignorance." This abstraction serves to eliminate consideration of special interests, i.e., interests that depend on the actual endowments and specific social and economic position of individual market agents. For this reason, the representative individual is also considered to be a *disinterested* individual. By not having any special pleading or special advantage, he or she would choose the structure of the securities market with a view to what is in the common interest of all securities market agents.

Although its antecedents go back at least to Adam Smith, the veil of ignorance idea was developed independently by Harsanyi [1953] and Rawls [1971] in their widely known works advocating two very different types of ethical theories: utilitarianism and contractarianism, respectively. Wolff [1977, p. 16] called it "one of the loveliest ideas in the history of social and political theory." Rawls's description is sufficiently succinct to quote:

> . . . we are to imagine that those who engage in social cooperation choose together, in one joint act, the principles which are to assign basic rights and duties and to determine the division of social benefits. Men are to decide in advance how they are to regulate their claims against one another and what is to be the foundation charter of their society. Just as each person must decide by rational reflection what constitutes his good, that is, the system of ends which it is rational for him to pursue, so a group of persons must decide once and for all what is to count among them as just and unjust. The choice which rational men would make in this hypothetical situation of equal liberty, assuming for the present that this choice problem has a solution, determines the principles of justice [1971, p. 11f].

The veil of ignorance idea is a theoretical device which produces a purely hypothetical situation.[6] Its primary function is to produce a condition of so-called radical uncertainty [Rawls, 1971] by taking away from individuals any information which might enable them to identify their own position in the resulting structure. They are thus prevented from making a choice that is in their own personal interest (without regard for the interests of others). Furthermore, the choice is binding on security market agents.[7]

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[6] This form of argument does not presume that such a situation ever existed or that such a choice was ever actually made. The historical facts are irrelevant. Rather, it is sufficient to be able to explain why securities market agents should have chosen a standard setter, even if other historical reasons account for its actual existence. The purpose of the analysis is to provide an understanding of the basic principles that might govern the actions of existing standard-setting bodies. Explanations of this sort are called potential explanations [Hempel, 1965]. A potential explanation is such that the theory and statements of conditions providing the explanation (more precisely, the description) of an event or state of affairs need not all be true [Hempel, 1965, pp. 273–278; 338]. Lack of truth is not by itself a criticism of the theory. In particu-

To implement the veil of ignorance form of analysis, a decision criterion for the representative individual must be chosen. Two alternatives have been used previously. Harsanyi [1953, 1975] advocates that individuals behind the veil of ignorance choose so as to maximize expected utility. Because of the level of uncertainty in this situation, the principle of insufficient reason [Luce and Raiffa, 1957, Ch. 13] is used to assign probabilities to the possible outcomes. Specifically, the probability of being any given member of the society is deemed to be $1/n$, where n is the number of members in the society. The expected utility of alternative social structures and principles is then calculated by summing the utility of being in each individual position under the given structure, weighted by the probabilty (i.e., $1/n$) of being in that position. The other choice rule, advocated by Rawls [1971], is the maximin principle. According to maximin, individuals are to choose an alternative that minimizes the maximum loss. As applied to the veil of ignorance form of analysis, a lexicographically-ordered generalization of maximin, called leximin, is used. According to leximin, the representative individual should choose a social structure so as to minimize the maximum loss to the worst-off individual (or set of individuals). Once the satisfaction of their interests has been maximized, the representative individual is to choose so as to minimize the maximum loss to the second worst-off individual (or set of individuals). One specific point that should be clearly noted is that inequalities among individuals are allowed —but only as long as these inequalities do not harm individuals at the lower end of the social hierarchy (i.e., higher in the lexicographical order).

The relative merit of the two approaches is an on-going unsettled controversy. The main difficulty with leximin is its extreme conservatism. As Harsanyi [1975] points out, a small decrease in the welfare of even one individual could outweigh large increases in the welfare of every other individual in the society. Because of its lexicographical ordering, this consequence is analogous to but much stronger than the unanimity implicit in the Pareto efficiency criterion. According to leximin, the worse-off individuals would actually have to be compensated, up to the point where their welfare is maximized, for a social structure to be acceptable. Harsanyi [1975] finds this to be too strong, because there ought to be at least the possibility of trading off the interests of one individual or group against the interests of another.

A major difficulty with the expected utility approach is that it requires much

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lar, in the normative context relating to the user primacy principle, the underlying principles and assumptions are not to be accepted or rejected on the basis of its predictive ability. See Nozick [1974, p. 9].

[7] Choice behind a veil of ignorance has generally been viewed as an n-person cooperative game, the point of which is to reach a unanimous agreement (i.e., Pareto-efficient equilibrium) concerning the fundamental principles governing human interaction. This implies that agreements made behind the veil of ignorance are binding on persons when they are no longer behind the veil. This has been a controversial issue that strikes at the heart of such analyses. Consideration of this issue is beyond the scope of this paper. Following Rawls [1971] and Wolff [1977], the cooperative game framework will be used. This implies that agreements are binding.

stronger informational assumptions than leximin. For example, the welfare of individuals must be adequately measurable as a single real number [Strasnick, 1976]. A standard criticism of utilitarianism, one version of which is a theorem in Harsanyi's system, is that it does not adequately protect valued rights and freedoms, e.g., political liberties. Because this approach requires single-valued individual utility functions, some items (such as the right of a minority to express unpopular political ideas) that (according to this argument) should not be subject to such trade-offs are not adequately handled.

More directly relevant for the immediate purposes of this paper is that the expected utility approach to the veil of ignorance situation requires stronger assumptions about the interpersonal comparison of individual utility. This may be seen by noting that the expected utility of various courses of action is evaluated behind the veil of ignorance by summing utilities across individuals. The leximin criterion requires only that the representative individual be able to determine the level of welfare of each individual to determine the sequence of the lexicographical ordering of individuals. More precisely, if utility levels but not differences are interpersonally comparable, leximin follows. However, if utility differences are comparable, regardless of the comparability of utility levels, the average utility rule follows [Deschamps and Gevers, 1978; Sen, 1977; Sen and Williams, 1982].

Selection of one of these decision criteria is a difficult and controversial matter of evaluating their strengths and weaknesses. At the same time, it may not matter, in some specific cases, which decision rule is used, at least in the sense that use of both rules yields the same outcome [Harsanyi, 1975]. Since the expected utility approach appears to be more consistent on balance with economic approaches to corporate financial reporting issues already in the accounting literature, it will be used in this paper.[8]

Agreement on User Primacy

Two versions of the user primacy principle have been advanced in the standard-setting literature. The first is based on the traditional concept of accountability [Ijiri, 1975, pp. 29–33] and on the more recent separation of ownership from management in widely held corporations [Paton and Littleton, 1940, pp. 1–6, and the agency literature generally]. This version will be called here the basic user primacy principle. It has received its clearest endorsement in the report *Objectives of Financial Statements* published by the American Institute of Certified Public Accountants:

> An objective of financial statements is to serve primarily those who have limited authority, ability, or resources to obtain information and who rely on financial statements as their principal source of information about an enterprise's economic activities [1973, p. 17].

A more complex version of the principle, which will be called the extended user primacy principle, was advanced more recently in the Conceptual Framework of the Financial Accounting Standards Board:

> Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions. The information should be com-

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[8] It will be seen that the outcome in this case is relatively insensitive to the choice of decision rule. The leximin analysis yields the principle unambiguously, whereas the expected utility argument requires additional assumptions about the information available to representative individuals.

> prehensible to those who have a reasonable understanding of business and economic activities and are willing to study the information with reasonable diligence [1978, p. vii].

The extended version is apparently an outgrowth of recent work in accounting and finance on the behavior of securities markets. The idea seems to be that because of the ways in which securities markets apparently work, it is important to distinguish classes of users according to their ability to deal with complex information. According to the extended principle, it is legitimate, from an efficiency point of view, to concentrate on the information needs of "sophisticated" investors [Beaver, 1973].

The two versions of the general principle are similar insofar as the priority claims of investors and managers are concerned. As long as investors are at an informational disadvantage *vis a vis* managers, both versions require "in effect, that when conflict situations arise, the disadvantaged individuals are to have sufficient power to achieve their wishes" [Beaver and Demski, 1974, p. 178]. However, by countenancing a distinction *within* the general class of investors, the extended principle recognizes the possible existence of conflicts among investors. The FASB's extended principle, as stated, is consistent with the possibility that the FASB could legitimately promulgate standards which would leave the least-advantaged investor worse off. The equity foundations of the two principles are examined below.

The Basic User Primacy Principle

The following assumptions are made concerning the knowledge of securities market agents.

1. Regarding securities market decisions, all securities market agents are, and know each other to be, risk-averse expected utility maximizers. The production and consumption of financial information is an essential component of their maximizing strategies.
2. All securities market agents have an adequate understanding of economic activity, especially concerning the workings of markets and their role in the allocation of resources. This means, among other things, that they understand the desirability of a Pareto-efficient securities market, both in terms of the allocation of resources and in terms of the ability of securities market agents to act independently of one another.
3. Securities market agents know that the securities markets exist in a complex and dynamic environment, both politically and technologically. Therefore, environmental changes may occur which affect the functioning of firms in ways that cannot reasonably be anticipated. For this reason, information demands of investors may be expected to change, continually and perhaps rapidly, and in unanticipated ways. Therefore, agreed-upon disclosures of financial information will need to be amended or modified from time to time.
4. There are two kinds of securities market agents: investors (users of financial information) and managers of widely held corporations (producers of financial information). Members of the two classes have conflicting interests regarding the conduct of the corporation, both in general and in the provision of financial information in particular.

Assumption 1 describes the general

characteristics of securities market agents as rational decision makers who make investing and financing decisions by maximizing expected utility. Assumption 2 states that they understand the nature of the market in which they interact. According to assumption 3, some mechanism for changing the measurement and disclosure of financial information is necessary. A once-and-for-all agreement regarding specific disclosures not subject to revision would be undesirable. Instead, securities market agents could re-negotiate past agreements directly, rely on a third party to effect changes via the promulgation of standards, or do both simultaneously. According to assumption 4, the only interests to be considered by representative security market agents are those of investors and managers. Since investors are already assumed to be rational economic agents, each investor is assumed to be diversified. That is, each investor is an actual shareholder in some firms, and a potential investor in others. Therefore, all investors expect to bear directly part of the costs of disclosure by firms in which they (actually) invest and are free riders with respect to firms in which they are potential investors. Note that this does not introduce special interests into the analysis, since all investors are alike in not knowing which particular firms they have invested in or will invest in.

The non-identity of interests expressed in assumption 4 causes the difficulty that forms the focus of this paper. On the one hand, it is not difficult to argue that investors would prefer a market in which the conditions for Pareto efficiency were met. Investors could do no better than to have an ideal securities market, in the sense that adding a centralized allocation mechanism would not increase its efficiency.[9] On the other hand, managers do not have the same interest in an ideal securities market. The often claimed divergence of interests between owners and managers [e.g., Smith, 1937; Berle and Means, 1968; Donaldson, 1963] may be manifested in various market-related ways. One of these ways emphasizes the role of information in the relationship between owner and manager. According to Monsen and Downs [1965, p. 228], two conditions are necessary for managers to increase their own income at the expense of the firm's efficiency: (1) managers act in their own interests, and (2) "it is impossible or very difficult for their superiors to discover these acts." This implies that one of top management's key strategies is "carefully screening all information which is forwarded to stockholders or the public at large" [Monsen and Downs, 1965, p. 232].

The result is that managers have both an incentive and the ability to deceive investors, in virtue of their control of the firm's information system. In the acquisition of capital and in the managerial labor market (hiring, remuneration, and retention) [Fama, 1980], it is to managers' advantage to have the discretion either to disclose or to fail to disclose information to investors, in order to put themselves in the best possible light. The existence of this incentive has structural consequences for the securities market. This is because deceptive financial information violates the fundamental concept of economic analysis, that economic behavior is completely voluntary. The production of deceptive financial information is an interference in the free functioning of the securities market.

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[9] The term "ideal" is taken to mean that the necessary conditions for a Pareto-efficient allocation of resources are perfectly satisfied. This requires, among other things, that all transactions are purely voluntary, all economic goods are pure private goods, transactions are costless, and there are no adverse selection problems [Akerlof, 1970] brought about by the conflicting interests of the managers and owners of widely held corporations.

Intentional deception is a form of coercion [Bok, 1978, p. 18]. The receiver of an intentionally deceptive message is not merely *unable* to act in ways he or she would act otherwise. By being given a deceptive message, he or she is *prevented* from doing so. Not being completely free in his or her actions, they have an involuntary element. This lack of freedom is central to the topic of deception. The lack of freedom of choice changes the distribution of power between deceiver and deceived—more goes to the former, less to the latter [Bok, 1978, p. 19].

The traditional view of financial reporting is that it is supposed to aid users of the information in making investment decisions. The benefit of such communication is thus supposed to accrue to them. But the value of intentionally deceptive information lies primarily in its benefit to the sender. Indeed, the purpose of deception is to affect the relative power of people (here, securities market agents).[10] As the existence of laws against fraud indicates, people regard the possibility of deception in their economic relationships as an issue of fundamental importance. *Mis*information is more than *false* information. Its effect is more fundamental, because the intent of deception is to alter the underlying relationships among individuals. For this reason, it is not sufficient in this context to treat misinformation (deception) simply as an economic "good" to the sender and as a "bad" to the receiver. Deception has structural consequences quite different from the mere existence of uncertainty. From the perspective of the deceived [Bok, 1978, pp. 30ff], deception is not neutral. Rather, there is a presumption against deception such that it needs to be justified, while truthfulness does not [Bok, 1978, p. 30; Isenberg, 1964, p. 259].

If representative securities market agents regard the incentive and ability of managers to deceive investors as sufficiently important to the latter, then they will choose (behind the veil of ignorance) a market structure which will tend to correct the information asymmetry. It will do so by limiting the ability of managers to act purely in their own interest, i.e., by constraining the feasible set of actions open to them. The effect of the presumption against deception is to put a positive value on a kind of symmetry condition. An absence of deception would mean a lack of systematic bias in the ability of any class of securities market agents to make free transactions on an equal footing with all other securities market agents. Any securities market agent who knew himself to be an investor clearly would prefer not to be deceived. On the other hand, it is not clear why a securities market agent who knew himself to be a manager would choose voluntarily to include any feature in the basic structure of the securities market which would, in unanticipated ways, limit his utility-maximizing ability to produce such information.

Although there is a conflict, the interests of the two groups are not diametrically opposed. Both sides have something to gain by participating in the securities market. But since it is possible for managers to act in their own interest at the expense of investors, it is possible that some investors would choose to protect themselves by withdrawing from, or reducing their participation in, the securities market. The issue here is whether any principles and institutional structures would be established to protect

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[10] For a more complete treatment of deception in corporate financial reporting, see Gaa and Smith [1985].

TABLE 1

NORMALIZED UTILITIES FOR CHOICE OF INSTITUTIONAL STRUCTURE (BASIC USER PRIMACY)

	User Primacy	Non-User Primacy
$U_{manager}$	0	1
$U_{investor}$	x	0

investors from loss by limiting the ability of managers to misinform them, and thus increase the ability of both investors and managers to benefit from the market's existence.

Because of these conflicting interests, unanimous consent on the principle of user primacy would occur only if every manager found it utility-maximizing to constrain his own behavior in advance. This constraint would consist in the establishment of a third party, having the enforceable power to redistribute wealth from managers to investors by promulgating financial reporting standards.

An argument to such a conclusion, based on a rational decision of security market agents who knew themselves to be managers, and thus the "losers," would be complex and quite possibly inconclusive.[11] Agreement would be unlikely because of the self-interest of managers in being free of external constraints in maximizing their utility. Because the user primacy principle is extremely conservative in the degree of protection afforded to investors, any such argument is likely to involve extreme assumptions about, for example, the utility functions of or uncertainty facing managers.

A representative, disinterested securities market agent, however, would not choose an institutional structure on such narrow grounds. By making securities market agents ignorant of their individual characteristics that produce the conflict of interest, those characteristics (biases) causing them to have special (private) interests in the structure of the securities market are eliminated. Such a person is representative of all securities market agents in that any one of them could be chosen arbitrarily and would make the same choice as any other regarding the ideality of the securities market. If securities market agents were stripped of the knowledge of their individual endowment and position in the securities market, then they would make a disinterested choice that is in the interest of all, without regard to any individual's special situation.[12]

Table 1 is a matrix of normalized utilities associated with the choice of institutional structure. The utility numbers refer to the utility of an individual who turns out to be a manager or investor, depending on the structure of the securities market. The problem is to choose between two such structures: one in which the user primacy principle is implemented and one in which the principle is not operative. Based on the discussion above, it is plausible that $0<x\leq 1$, where x is the utility of user primacy to investors. While an investor gains by the existence of a standard setter implementing the principle, managers gain more by having a market structure in which the conflicting interests of managers and investors are traded off, either by a standard setter or via market transactions. One reason for this might be that investors, but not managers, are assumed to be diversified. The point of the veil of ignorance is that the representative securities market agent is uncertain as to whether he or she is an investor or a manager.

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[11] For example, it may be suggested that an argument based on a multi-period prisoners' dilemma would not yield the principle of user primacy.

[12] As Narveson [1984, p. 168] states, "since the problems stem from disagreements among individuals in the first place, they can hardly expect to get anywhere by simply insisting on what is reasonable from their own point of view. The question is what it is reasonable for *us* to adopt in the way of restrictions on our several behaviors; and this can be done (if at all) only by discerning what there is in our interactions that can make it reasonable from *everyone's* point of view to adopt such restrictions."

The expected utility approach will produce agreement on the user primacy principle, but only with additional assumptions. User primacy would be agreed upon behind the veil of ignorance if and only if implementation of the principle would maximize social welfare as evaluated from behind the veil of ignorance. This requires that an alternative should be chosen that maximizes $\sum_{i=1}^{n} U_i$, where n is the number of security market agents and U_i is the utility of individual i. As discussed above, it must be assumed that differences in individual utilities are interpersonally comparable. As applied to the present situation, user primacy will be chosen as a distributive principle if and only if it maximizes $\sum_{i=1}^{m} U_i + \sum_{j=1}^{p} U_j$ where m individuals turn out to be managers and p individuals turn out to be investors. Therefore, the representative individual must know at least the proportion between the two classes (i.e., investors and managers). By weighting equally the utility of each individual position in the market, the expected utility criterion becomes operational.

Based on Table 1, the user primacy principle would be chosen if and only if $x>m/p$. This reveals clearly that adoption of the principle depends on two things: (1) how much investors gain by implementation of the principle, relative to how much managers lose; and (2) the proportion of investors to managers in the securities market. Since both of these are contingent facts about the market, user primacy is not established (using the expected utility criterion) on purely *a priori* grounds.[13]

The result, according to this analysis, is that it is not necessarily preferable for the user primacy principle to be part of the structure of the securities market. For, while it may be valuable to investors to have such a distributional principle (compared to the value to managers of a principle of neutrality), it is socially desirable only if investors outnumber managers by a wide enough margin. The basis for this is that the interests of one group may be traded off against the interests of another group.

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[13] The leximin analysis of the situation is straightforward. Control of corporate information by managers gives them an advantage over investors via the possibility of deception. A securities market in which deception is practiced is systematically biased against investors. An individual who knew himself to be a manager would prefer a market that does not constrain such behavior, while an individual who knew himself to be an investor would prefer a market with constraints against deception. In the face of radical uncertainty about both their actual position in the market and their endowment, the leximin rule requires individuals behind the veil of ignorance to choose as if they knew themselves to be investors. Therefore, the utilities accruing to a manager are totally discounted. Thus, a representative securities market agent would choose a market that is more nearly ideal, that is, one that is unbiased (symmetric) with respect to whether one is an investor or a manager.

TABLE 2

IMPLICATIONS OF x, m, AND p ON THE ESTABLISHMENT OF USER PRIMACY

	$m/p<1$	$m/p=1$	$m/p>1$
$x<1$	1 contingent	2 non-primacy	3 non-primacy
$x=1$	4 primacy	5 indifference	6 non-primacy
$x>1$	7 primacy	8 primacy	9 contingent

Table 2 shows the implications for user primacy of the various combinations of x, m, and p. For cells 2, 3, and 6, the total benefit to the class of investors is not sufficiently great to justify the protection afforded to them by the principle. In cell 9, user primacy is justified only if the benefits to users of implementing the user primacy principle are sufficiently greater than the benefit to managers of not having user primacy as a distributive principle. The analysis was limited at the outset to the case of widely held corporations, and it was subsequently assumed that investors are diversified. A situation in which user primacy was agreed to by many managers (one for each corporation) and many investors would fit in this cell. In cells 3, 6, and 9, there are more managers than investors. Therefore, it may be reasonable to believe that investors would be able to protect themselves even without a standard setter on their side, because managers would have to compete more fiercely for the investors' capital, which would include competing over the quality of information. The quality of information would be bid up in the securities market itself, rather than needing to be established by a standard setter acting in accordance with the user primacy principle.

Conversely, in cells 4, 7, and 8, the benefits to investors of establishing the principle are sufficiently great that user primacy is the clear choice behind the veil of ignorance. However, as discussed above, it is most plausible that $x<1$. Therefore, cell 1 is of primary interest. As in cell 9, whether user primacy is selected depends on contingent facts about the securities market. For example, if there are twice as many investors as managers, implementation of user primacy would be preferable if $x>0.5$.

Since the analysis is confined to the market for the securities of widely held corporations, the number of investors may be assumed to greatly exceed the number of managers. For example, if the representative securities market agent either assumed or was informed that there were 1,000 times more investors in the market than managers, user primacy would be chosen as the distributive principle governing the standard setter, as long as $x>0.001$.

It should be noted in conclusion that this analysis does not provide a complete rationale for the AICPA version of the user primacy principle. According to the

TABLE 3

NORMALIZED UTILITY FOR CHOICE OF INSTITUTIONAL STRUCTURE (EXTENDED USER PRIMACY)

	User Primacy	*Non-User Primacy*
$U_{manager}$	0	1
$U_{sophisticated\ investor}$	x	z
$U_{naive\ investor}$	y	0

AICPA, the users of primary concern are claimed to be those who both have "limited authority, ability, and resources" *and* whose principal source of information is financial statements. The analysis above refers only to the former characteristics. Whether the value of information accrues to investors and potential investors directly, or indirectly through intermediaries (e.g., security analysts), is irrelevant—as long as their interests have priority.

The Extended User Primacy Principle

Assumption 4 does not recognize any difference within the general class of investors regarding their ability to use financial information correctly. Therefore, it provides no support for the extended principle, over and above what it shares with the basic principle. The expected utility approach to the user primacy issue is easily adapted to consideration of the extended principle. While the analysis of the basic principle postulated the existence of only two classes of securities market agents, any number of classes of security market agents could be recognized, including singleton classes consisting of each individual.[14] The reason for this flexibility is that the basic decision criterion involves an evaluation of the utility of each individual. If there are two relevant classes of investors (sophisticated and naive), then the extended user primacy principle would be chosen if and only if doing so maximizes

$$\sum_{i=1}^{m} U_i + \sum_{j=1}^{s} U_j + \sum_{k=1}^{t} U_k,$$

where there are m managers, s sophisticated investors, and t naive investors. Table 3 shows the utilities associated with the alternatives for members of the three groups.

It is plausible that $0 \leq z < x \leq 1$, since a sophisticated investor would be able to benefit from implementation of the extended principle and would fare better than a naive investor in the absence of the principle. Then the extended version of the user primacy principle would be chosen if and only if $sx + ty > m + sz$. Rearranging this to $s(x - z) + ty > m$ shows clearly that user primacy is desirable as a distributive principle if and only if all investors taken as a group gain more by establishment of the principle than managers gain if it is not established. This result is similar to the analysis for the basic principle.

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[14] Whereas the distinction between investors and managers is relatively clear, the FASB provides no guidance as to how the different classes of investors are to be differentiated. This would be a significant operational problem for a standard setter if subclasses of the general class of investors are distinguished. For the purpose of this analysis, it will be assumed that relevant distinctions can be adequately operationalized.

The FASB's version of the user primacy principle is interesting because it focuses on the interests of the second worst-off group (sophisticated investors) rather than the worst-off group (naive investors). Furthermore, on closer examination, the FASB statement is quite vague as to the distributional consequences that it intends. For example, all information comprehensible to "naive" investors is presumably comprehensible to "sophisticated" ones as well, but not vice versa. Attending to the needs of sophisticated investors may harm the naive ones, but not necessarily so. Therefore, although the sense of the statement is that standards would be promulgated only with regard to sophisticated investors, the statement does not explicitly require this interpretation.

This indicates that the relative magnitude of x and y is unclear. On the one hand, it is plausible that $y>x$, since it is likely that naive investors would benefit more from the "protection" of a standard setter acting in accordance with user primacy. On the other hand, it is also plausible that $x>y$, since sophisticated investors may be better able to use the information generated via implementation of user primacy by a standard setter. Indeed, as the FASB [1980] implicitly suggests, it is possible that total social welfare would be maximized if its standard setting were directed primarily to sophisticated users—that is, by acting deliberately to cause x to be greater than y. This is still consistent with the general concept of user primacy, since both classes of investors would still have priority over managers in the standard-setting process.[15]

STANDARDS AND STANDARD SETTING

The analysis above did not, for the most part, refer to a standard setter. The principle of user primacy is of interest only to the extent that it could be implemented. For this reason, agreement behind the veil of ignorance on user primacy implies an agreement that it will be implemented. It is possible that it could be implemented to some extent via laws against fraud. To some extent, this is probably the case; such laws protect investors by providing legal grounds for civil and criminal proceedings.

At the same time, standard-setting bodies have existed for many years. On the one hand (as noted at the outset), if a standard setter is established in order to reduce inefficiencies in the production and consumption of financial information, then a distributional principle will be followed implicitly (assuming non-random choice) even if not explicitly specified. The above analysis provides a structure within which a standard-setting body could (with additional information) choose a distributional principle. On the other hand, the analysis also provides a structure for justifying the existence of a standard setter, independent of considerations of efficiency. This would be the case if direct voluntary arrangements among security market agents (to be discussed below) would not reduce the conflict to a mutually agreeable level. If so, the existence of a standard setter may be justified as the result of a voluntary, hypothetical agreement. Therefore, the analysis provided above has important implications for both the theory and practice of standard setting for corporate financial reporting. Because of a lack of a rigorous analysis of its possible foundations, the implications have not been clearly understood. A brief discussion of several points, based on the analysis given above, follows.

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[15] Application of the leximin criterion appears to be straightforward. Although it could itself be extended to any number of classes, the extended user primacy principle (as stated by the FASB) postulates the existence of three basically different classes of securities market agents. The interests of "naive" investors are to receive first priority, followed by sophisticated investors, and finally by managers. While the FASB version of the principle appears to favor sophisticated over naive investors, it is possible to derive the extended user primacy principle by introducing some additional principles. In view of the Rawlsian analysis given above, a natural candidate is the Difference Principle, because it follows from applying the leximin criterion to the problem of the principles of justice [Rawls, 1971; Strasnick, 1976]. The Difference Principle states that social and economic inequalities are to be arranged so that they are both (a) to the greatest benefit of the least advantaged and (b) attached to offices and positions open to all under conditions of fair equality of opportunity [Rawls, 1971, p. 83]. As applied here, the FASB's emphasis on the needs of "sophisticated" investors would be justified only if doing so were to the benefit of the (less advantaged) "unsophisticated" investor. Such might be the case, for example, if it were empirically true that the latter acted as price-takers and left the impoundment of financial information in security prices to sophisticated investors.

Is User Primacy Important?

Dopuch and Sunder [1980] question the importance of the user primacy principle for two reasons. First, they claim that statements of objectives and elements of financial statements, in general, are not useful because they do not appear to help settle specific financial reporting issues. Whatever the correctness of their conclusions regarding other aspects of the FASB's Conceptual Framework, the above analysis shows that user primacy should be regarded as a meta-level, or constitutional, proposition, stating whose interest is to have priority for any specific situation. Exactly for this reason, there is no particular reason to expect the user primacy principle to play a direct role either in choosing among specific alternative standards or in justifying the choices made. That is, if a standard setter (who adopted user primacy as the distributional principle) were to justify the choice of a specific standard by reference to user primacy, it would only be stating what should be true of every standard promulgated, and thus does little to explain why the specific standard chosen is "the best."

Second, Dopuch and Sunder [1980, pp. 14–15] criticize what they call the "dominant-group" interpretation of the objectives, on the ground that "there is little evidence that the user group has the power to impose its preferences on financial accounting"; the principle is therefore said to be "unworkable." The actual amount of power of users in the promulgation of financial reporting standards is obviously an important empirical issue. But the user primacy principle is not intended to *describe* actual relationships. Rather, it serves as a normative principle that constrains the standard setter to act in the interest of investors, thereby giving investors power to impose their preferences. The actual balance of power among interested parties is irrelevant in determining which group's interests ought to have priority, since these are not empirical issues. Indeed, recall that an important component in rationalizing the standard setter's role is users' (investors') lack of power. Thus, the claim that user primacy is "unworkable" is not a criticism of user primacy as a normative claim. Rather, if true, it is a criticism of the willingness of contending groups, and of the ability of the standard setter (e.g., the FASB), to act in accordance with the user primacy principle.

Objectives

The analysis, however, sustains an important observation made by Dopuch and Sunder. They suggest that the FASB might be better advised to try to formulate objectives for itself. The analysis based on the resolution of conflicting interests provides a foundation for such an objective. While it may seem to be a trivial point whether objectives are attributed to financial statements themselves [AICPA, 1973], to the institution of financial reporting [FASB, 1978], or to a standard-setting body, this is not so. The first two interpretations muddle the important observation made by Beaver and Demski [1974] that user primacy has distributional consequences. That is, the objective states a constitutional principle: in situations of conflicting interests, the claim of one contending group has priority.

In light of this observation, the analysis of user primacy provides the basis for formulating a clearer statement of the principle of user primacy. The extended version of the "primary objective" might be restated as follows:

> A standard setter for corporate financial reporting should promulgate rules which are in the interest of those present and potential investors and creditors who have limited authority, ability, or resources to obtain financial information. More sophisticated investors may disproportionately benefit by a standard, as long as the total benefit to the whole class of investors is maximized.

The leximin analysis (see footnote 15) would require that the second sentence read: "More sophisticated investors may disproportionately benefit by a standard, as long as less sophisticated investors are made as well off as possible."

Distributional Consequences

It is important to compare the distributional consequences of the above statement of the user primacy principle with previous analyses of the issue. User primacy conflicts with suggestions [e.g., Gerboth, 1973; Horngren, 1973; Dopuch and Sunder, 1980; Beaver and Demski, 1974] that the task of the standard setter should be to promulgate standards that represent compromises between opposing interest groups. The notion of compromise suggests that the interests of the various groups stand on a more or less equal footing, such that the interests of one may be traded off against the interests of the other. According to the concept of user primacy (including the extended version), such trade-offs are not allowable. If compromise is inevitable, then it only shows again the degree to which the standard setter is prevented from performing one of its primary tasks, implementation of user primacy. It is important to recall that the general concept of a social ordering of alternatives is not thereby lost. However, social welfare cannot be represented by a real-valued function; instead, the interests of the two groups are ordered lexicographically.[16]

According to the user primacy principle, the standard setter may act in managers' interests, but only insofar as this does not work against investors. Thus, it is quite possible for the standard setter to promulgate a standard that constitutes a movement to a Pareto-superior allocation of resources. However, a standard need not produce a Pareto improvement. For, while the standard setter's actions are constrained so that investors cannot be made worse off by a change in standards, there is no such constraint for the impact on more advantaged securities market agents. This unequal treatment may seem unfair to managers. The fairness of the user primacy principle lies at the deeper level of the symmetry of the fundamental relationship among securities market agents. According to the principle, it is irrelevant that a specific new financial reporting standard may restrict a corporate manager's reporting options, and thus decrease his expected utility.

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[16] Let social welfare be a function of the utilities of the individuals making up the group. Whereas a real-valued social welfare function maps individual utilities (preferences) into the real number line, a lexicographical ordering maps them into a vector space with real coordinates. This space is completely and consistently ordered if preference over outcomes (x,y) is defined thus:

$(x_1, x_2) > (y_1, y_2)$ *iff*
(*i*)$x_1 > y_1$

or

(*ii*)$x_1 = y_1$ and $x_2 > y_2$.

See Chipman [1960] and Banerjee [1964].

Voluntary Arrangements Among Securities Market Agents

The asymmetric relationship between investor and manager may result in an asymmetry in information. The adverse selection character [Akerlof, 1970] of the situation means that managers have an incentive to practice deception, since they cannot completely internalize the benefits of truth-telling. The asymmetry may be reduced in a variety of ways. But if investors cannot perfectly evaluate the quality of information furnished or signaled to them, then the problem of deception will not disappear. The goal of the standard setter is not to eliminate deception. In any case, this would be unrealistic. Rather, *from the investors' point of view*, there may be an amount of deception which is optimal, as defined by the costs and benefits accruing to them. Accordingly, the standard setter's role should be to choose rules or principles that will yield an optimal level of information quality, which includes an optimal amount of deception.

A variety of arrangements exist (e.g., incentive contracts, monitoring agreements, and the existence of signaling in general) to reduce the asymmetry problem. They have arisen within the structure of a securities market that has included a standard setter for 50 years. The standard setter establishes constraints on managers' reporting activities; efficient levels of voluntary reporting and signaling will occur within those constraints. These voluntary arrangements attenuating the investor-manager conflict do not automatically eliminate the need for a standard setter to implement the user primacy principle, although it may turn out that way if they reduce x or y (see Tables 1 and 3) sufficiently. Nor does the existence of a standard setter automatically eliminate the desirability of direct agreements. The importance of the interaction between two-party agreements and standards (selected by a third party) is summarized in the following statement:

> . . . the market does not work perfectly. In fact, it rather rarely works even close to perfectly. On the other hand, the political apparatus also does not work perfectly, and we must offset the defects of one apparatus against those of the other in order to choose which we will use in any particular application. This means, in general, that we should offset what are customarily called economic externalities with . . . political externalities [Tullock, 1970, p. 65].

According to the analysis of user primacy, a standard setter is free to allow direct, voluntary disclosure of financial information without any intervention on its part. But the standard setter should step in to implement the user primacy principle whenever necessary, to assure that the interests of investors are maximally satisfied.

SUMMARY AND CONCLUSIONS

The user primacy principle has been advocated by a number of individuals and organizations over many years. One version of it is espoused as one of the basic principles in the FASB's Conceptual Framework. Yet, there does not appear to have been any rigorous analysis of it in the literature. The fact that the principle persists suggests that it (together with a standard setter to implement it) may have a rational foundation. To the extent that Watts and Zimmerman's [1979] or Dopuch and Sunder's [1980] empirical claims regarding financial reporting standard setting are correct, the need is all the greater to explain what (if any) legitimate role such a standard setter is performing. Without such an analysis, no standards for approving or criticizing their behavior exist. The purpose of this paper is to investigate the logical foundations of the user primacy principle, not to advocate it. It is based on contemporary work in ethics and social and political philosophy, in which humans are regarded as rational decision makers, and in which principles governing individual and group behavior are the result of rational decisions.

It is shown that the principle is derivable from a set of more basic principles, together with a set of fairly plausible assumptions about the securities market. However, the analysis does not establish the soundness of the principle, since the acceptability of the conclusion depends on the acceptability of its premises. It is possible that alternative analyses could be developed which have either similar or contrary conclusions. If other sets of assumptions are found to imply the principle, then this would show either that there are a number of different reasons for the validity of the principle or that user primacy is robust, in the sense that it holds for a variety of initial conditions.

The choice of a securities market, the structure of which includes a standard setter to implement the user primacy principle, is a constitutional choice. Its purpose is to protect investors against losses due to the incentive of corporate managers to deceive them. Investors can thus take better advantage of the benefits a securities market affords them. Buchanan and Tullock [1962, p. 72] have described this in more general terms:

> Each individual will in the course of time, if allowed unrestricted freedom within the limits of the legal structure, impose certain costs on other parties; and, insofar as his own position taken alone is concerned, he will prefer to remain perfectly free to impose costs on others when he desires. On the other hand, he will recognize also that he will, on many occasions, be affected negatively by the actions of others over whom he can exert no direct control and from whom he cannot legitimately demand compensation. Knowing that he will more often be in the second situation than in the first, the fully rational individual will explore the possibility of contractual arrangements designed to protect him from external cost along with constitutional processes and provisions that may remove actions from the realm of private decision and place them within the realms of public choice.

Two versions of the extended user primacy principle were proposed for further examination, which interpret it explicitly as a distributional principle governing the standard setter's actions, and which explicitly state how the standard setter is supposed to resolve the conflicting interests of its constituents. According to the analysis given here, user primacy gives less advantaged securities market agents absolute priority in the satisfaction of their interests. Among a set of Pareto-efficient outcomes, it selects one which maximizes that group's welfare, without any trade-off. Furthermore, Pareto efficiency will be violated whenever doing so leaves the least advantaged as well off as they can be. Because of the vagueness of the FASB's formulation of the user primacy principle, it is not clear whether it would endorse the principle as reconstructed. In any case, it is clear from this analysis that the Board needs to clarify the question of whose interests have priority in the setting of standards.

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Functional Fixation and Interference Theory: A Theoretical and Empirical Investigation

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ABSTRACT: This study uses interference theory to test the hypothesis that exposure to cost and income measures causes fixated responses in a decision-making setting where market value is the appropriate response. These fixated responses have been observed in both the functional fixation and prospect theory literatures and are related to materiality and certainty. The number of accounting courses subjects had completed was used as a surrogate for amount of exposure to cost and income. Approximately 50 percent of the subjects exhibited evidence of fixation on either income or cost measures. Materiality, but not certainty, had an impact on the fixation. Exposure to accounting courses was not related to this fixation. In fact, weak support was found for accounting as an aid in encoding the correct (i.e., market value) response. Age was the only variable positively correlated with the improper use of cost and income data.

ACCOUNTING procedures and processes play a significant role in the functioning of modern societies. This role has been documented by numerous behavioral and market-based studies [Ball and Brown, 1968; Hopwood, 1974; and Merchant, 1981]. But the impact of accounting procedures on the everyday conduct of an ordinary member of society is a relatively unexplored area. Certainly, accounting procedures affect individuals through their use as a basis for taxation, policies for economic controls (i.e., price and wage controls), regulation of commercial sectors, and finally, through evaluation of an individual's job performance. Schumpeter [1950] was one of the earliest economists to recognize the impact accounting processes could have on a member of society. He stated:

> Capitalist practice turns the unit of money into a tool of rational *cost-profit* calculations, of which the towering monument is double entry bookkeeping . . . primarily a product of the evolution of economic rationality, the cost-profit calculus in turn reacts upon

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> that rationality; by crystallizing and defining numerically, it powerfully propels the logic of enterprise . . . this type of logic or attitude or method then starts upon its conqueror's career subjugating-rationalizing-man's tools and philosophies, his medical practice, his picture of the cosmos, his outlook on life, everything in fact including his concepts of beauty and justice and his spiritual ambitions [emphasis ours, pp. 123–124].

While Schumpeter's concerns seem extreme, accounting researchers have discussed the impact of accounting's emphasis on cost-profit calculations [Sterling, 1967 and 1973; Edwards et al., 1979]. Consider Revsine's remarks:

> The process by which users may be *conditioned* to the data they receive could occur in at least two ways. First, as students in business training curricula, the prospective users are introduced to generally accepted accounting principles and the financial statements that result from the application of these principles and their derivative procedures. Furthermore they are taught manipulative operations and techniques such as ratio and funds flow analysis that utilize accounting data as a means for evaluating enterprise performance and prospects. In short, users are generally *indoctrinated* concerning the relevance and utility of traditionally disseminated information. Second, this *formal conditioning is continually reinforced* by each external report that users receive [emphasis added, 1973, pp. 50–51].

The emphasis in our society on cost and/or income could affect people's decision processes, resulting in a conditioning phenomenon. If one is given a consumption choice between an item that is sold for $10 and another sold for $12, the original costs are generally irrelevant (ignoring taxes). Yet, social conventions, such as income tax laws, which specify cost and income as crucial inputs, may cause people to react to this choice in unexpected ways. For example, if pervasiveness of cost data has changed simple decision-making behavior, one might observe a person choosing an item with a higher original cost even if it has a lower current value. If such behavior is widespread, there may be a high societal cost due to suboptimal decision-making behavior.

The purpose of this research is to use a theoretical structure to try to explain why individuals make suboptimal wealth maximization decisions. We examine whether individuals' past experiences with the dominance of cost and profit data in economic decision situations reduce the likelihood of correct wealth maximization decisions. The most direct way to test this proposition would be to compare the decisions of two groups of people, identical in all respects except that one group is exposed to these economic institutions and the other is not. Obviously, this is simply not feasible.[1] Assuming that accounting training is a reasonable surrogate for exposure to cost and profit-based decision processes, an indirect way to provide evidence about this issue is to compare the decisions of individuals who have received significant accounting training to the decisions of individuals who have not. To develop hypotheses regarding the differential behavior of these two groups, we propose a framework that describes the conditioning effects as a type of functional fixation. We use a learning theory development called interference theory to explain the fixation.

The remainder of this paper is divided into seven sections. The first examines the relationship between the conditioning phenomenon, prospect theory, and functional fixation. The second and third sections provide an in-depth discussion of interference theory and its potential for explaining functional fixation and/or conditioning effects. The next section presents an experimental design to test for functional fixation caused by exposure to accounting procedures and processes. The fifth part presents the experimental results. A discussion of the results follows, and a concluding section presents limitations and suggestions for future research on this topic.

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[1] While we might be able to recruit subjects from the African interior to be in the group totally unexposed to the economic institutions, we would, among other problems, introduce a bias due to cultural differences.

FUNCTIONAL FIXATION AND PROSPECT THEORY

The conditioning effect resulting from cost or income data emphasis can be conceptualized as a form of functional fixation, a psychological concept that has been addressed in the accounting literature [Ijiri et al., 1966]. Ashton [1976, p. 4] described how accountants might conceive functional fixation: ". . . a decision maker might be accustomed to using . . . data for one function (e.g., to assist in making pricing decisions) and . . . this 'preutilization' would inhibit his discovery of other functions of that data (e.g., to assist in making production decision)." Fixation on cost and income data may leave individuals without the ability to discriminate, unaware of the appropriate contexts for the use of those data. That is, correct usage of market value data may become difficult for persons continually exposed to a variety of institutions demanding cost data.

Accounting research on functional fixation has provided evidence of such a "conditioning" response to certain accounting procedures. Abdel-khalik and Keller [1979, p. 17] assessed whether users of accounting data "become conditioned and fixated on using reported earnings and on ignoring other information signals." Their results were consistent with a fixation hypothesis. They concluded: "The evidence reported here seems to suggest that some informed persons are unable to adopt readily new information or changes in measurement rules relating to some variables which they have consistently relied upon in making similar decisions in the past" [1979, p. 52]. Other researchers (see, for example, Ashton [1976], Chang and Birnberg [1977], Dopuch and Ronen [1973], and Dyckman et al. [1982]) have tested the "functional fixation hypothesis" and found many decision makers who continued "to reflect elements of past behavior—which should have been forgotten" (Chang and Birnberg, 1977, p. 311].

While the arguments presented above are based primarily upon conditioning theories of the origins of functional fixation, Tversky and Kahneman have proposed Prospect Theory as a more cognitive explanation of the manner in which individuals come to violate traditional axioms of choice. They introduce the notion of "framing" to suggest the difficulty of establishing generalized models of optimal choice. This "frame" is defined as:

> The decision-maker's conception of the acts, outcomes, and contingencies associated with a particular choice. The frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the *norms, habits and personal characteristics* of the decision-maker (emphasis ours) [1981, p. 453].

While Prospect Theory shares the same arena of inquiry as is approached in this study, differences exist in the explanatory constructs assumed. The area is mentioned here only to point out that it is related to our hypotheses and may provide alternative means to address the same questions. We employ a framework developed from the learning theory literature. This theory posits that previous knowledge (e.g., training in cost and income decision contexts) can either interfere with or facilitate effective decision-making.

INTERFERENCE THEORY

Transfer

Interference theory is an outgrowth of the "transfer of training" hypothesis—the idea that what is learned in one task may be carried over (sometimes inappropriately) to another task. A classic example is the supposed transfer that takes place from the learning one acquires in school to the many situations one experiences later in life. *Some* kind of transfer of training is assumed even though the later experience may be functionally unrelated to any specific schooling.

Many effects may moderate the nature and degree of the transfer, and it may have dysfunctional effects; "transfer may facilitate the learning of the second task, or conceivably have an inhibitory effect and interfere with the second learning and the mastery of the second task may help or hinder the subsequent performance of the first task" [Woodworth and Schosberg, 1954, p. 733].

Retroactive Inhibition

When the direction of a negative (inhibitory) transfer is from a later to an earlier task, it is a case of what Muller and Schumann [1894] called retroactive inhibition or retroactive interference. If retroactive interference is in effect, then interpolated or subsequent learning of Task 2 affects the later performance of the originally learned task.

In general, transfer is empirically assessed by comparing the performance of a group learning a single task with the performance of a group learning two tasks sequentially. Catania [1979] specified the design of retroactive interference studies as follows:

Experimental Group	Learn Task 1	Learn Task 2	Test Task 1
Control Group	Learn Task 1		Test Task 1

Under a hypothesis of retroactive inhibition, the experimental group's performance on the test of Task 1 is expected to be lower than that of the control group because of the retroactive interference of Task 2 on the earlier learned Task 1.

The early interference literature did not investigate the transfer of abilities *per se*, but rather, the transfer of stimulus-response units. Negative transfer was described as learning an $A-B$ pair followed by learning an $A-C$ pair. The theory proposed that $A-C$ learning, requiring the response C to stimulus A, retroactively interfered with the originally learned response B to stimulus A. Importantly, functional fixation has been described as "a classic case of negative transfer" [Kagan and Havemann, 1976, p. 149].

Rote Versus Logical Learning

Many of the earlier retroactive interference studies used nonsense syllables to test the theory. Other researchers suggested that a different effect may be found when the learning tasks have a stronger cognitive basis. Several studies [Ausubel et al., 1957, 1968; Wong, 1970] tested for retroactive interference using meaningful verbal prose passages rather than nonsense syllables and found little retroactive inhibition exhibited. These studies suggest that subjects relate later learning back to original learning, stimulating "a review of the original task which counteracts the interference effect that typically occurs in rote learning studies" [Wong, 1970, p. 414]. Retroactive inhibition, then, is sometimes diminished in situations where the learning is more intuitively meaningful. However, more recent studies in the verbal learning literature on interference in associative memory found aspects of interference [Roediger, 1978; Mehle et al., 1981; Hoch, 1984]. Thus, the overall results are inconclusive; the results of some studies were consistent with retroactive inhibition, whereas other studies showed evidence of retroactive *facilitation*. Current research is designed to distinguish when interference as opposed to facilitation will occur.

An Extension: Stimulus Encoding

The retroactive facilitation effect found in logical learning tasks was one of the motivations for the Stimulus Encoding hypothesis developed by Greeno [1970] and Martin [1971]. Their Stimulus Encoding theory suggested that the A in $A-B$ learning was not the same as the A in $A-C$ learning; different response sets imply that different salient features in stimulus A were "encoded" with each response. "What gets retrieved in recall . . . depends on which encoding of the nominal stimulus get sampled . . . " [Crowder, 1976, p. 257]. In other words, a distinction is made between the nominal stimulus provided by the experimenter and the functional stimulus perceived by the subject. The Tversky and Kahneman [1981] studies discussed earlier provide support for the stimulus encoding hypothesis. They found that subjects exhibited predictive shifts of preference resulting from sampling different salient features of the same stimulus situation (see also Tversky [1977]). The subjects' responses depended on how the subjects "framed" the stimulus. Stimulus encoding or framing would predict retroactive inhibition when subjects sampled the salient feature of A that was most dominant in $A-C$ learning. On the other hand, retroactive facilitation might appear when sampling the salient feature of A that was most dominant in $A-B$ learning. This hypothesis could explain both retroactive interference and retroactive facilitation.

IMPLICATIONS FOR ECONOMIC BEHAVIOR

We hypothesize similar patterns of response to stimuli from individuals dealing with accounting phenomena. People observe cost and income data being used in a variety of decision-making situations. Learning to use cost and profit data in a number of tax-related and business-related contexts might interfere with the rational use of market prices in making current economic decisions. The "stimulus" for the use of cost and income measures may be so strongly reinforced through accounting training that people are unable to identify decision contexts where those measures might be dysfunctional.

Some support exists for the idea that fixation could arise within a wealth measurement framework. Alexander [1973, p. 13] has remarked, "It is probably obvious to most people that market value is the appropriate measure of well-being associated with each item of wealth in a man's possession." However, in many of the experiments cited by Kahneman and Tversky [1979] in support of prospect theory, many subjects framed their decision problems in the contexts of gains and losses rather than in terms of the asset's market value. Thus, cost and income measures used by accountants, taxing authorities, and others in a large variety of decision contexts may result in fixation.

The interpolated learning of cost and income data, accompanied by weak stimulus discrimination conditions, may produce a retroactive interference effect upon the "correct" use of market value in a wealth assessment decision context. What we would optimally like to have are two distinct stimulus-response pairs: one for market price ($A-B$) and one for cost of income ($C-D$), with separate stimuli and responses for each. But it is possible that C is confused with A, resulting in an $A-B$, $C-B$ paradigm. Response B becomes the fixated response. These are precisely the conditions that are necessary for retroactive interference and thus for fixation to occur.

However, because tax, accounting, and other cost or income-oriented information is probably similar in structure to meaningful verbal prose, we might discover retroactive interference being counteracted by stimulus encoding. The mixed results of some of the accounting functional fixation studies suggest that stimulus encoding might occur for certain subjects. For example, Dopuch and Ronen [1973] suggested that as students had more accounting training they were less likely to exhibit evidence of fixation on income effects of a LIFO-FIFO switch. Perhaps the A in $A-B$ (market value) learning is, in fact, being distinguished from the C in $C-D$ (cost or income) learning as a result of the additional accounting classes.

THE EXPERIMENTAL STUDY

To test the effect of exposure to cost and income learning, we asked three groups to make simple wealth maximization decisions. Each subject was asked to choose between two items. Neither item was described, but subjects were told what each item cost when purchased and for what price each could be sold. (More details are provided in the experimental design section.) Normatively, subjects should choose the item with the higher selling price because they could sell the higher-priced asset and purchase the other if they preferred the item not chosen (selling prices always exceeded the original costs).

Hypotheses

The hypotheses posited that prevalence of cost and profit information interferes with (that is, causes fixation) or facilitates appropriate market-based decision models. In particular, if stimulus encoding is dominant, then subjects with more cost and profit exposure should be more likely to use the market price data than those with less exposure. If retroactive inhibition dominates, then the opposite effect should be discerned.

Three groups were compared to explore this question. Subjects in one group had no formal accounting or business training, subjects in the second had two accounting courses, and subjects in the third group had four or more accounting courses. Thus, the number of accounting courses was used as a surrogate for exposure to cost and income measures. The treatment effect (exposure to cost and income measures) is latent and unobservable and must be measured by a surrogate. That is, it is impossible to determine for any individual the amount of exposure to cost and income decision situations. Accounting courses do present many decision situations in which cost and/or income are the appropriate responses, thus being a fertile ground for retroactive interference. Conversely, managerial accounting courses typically discuss historical costs as being sunk and irrelevant in many decision situations and thus could provide the appropriate setting for retroactive facilitation or stimulus encoding. However, the results of the study depend on the validity of accounting courses as a surrogate for cost and income exposure.

The experimental design followed the classic retroactive study:

Experimental Group	Learn Sales Price → Learn Cost-Profit → Test Sales Price
Control Group	Learn Sales Price ——————→ Test Sales Price

If retroactive interference occurs, then the experimental groups (accounting-trained subjects) will perform worse on a test of the appropriate sales price response than the control group (subjects with no accounting or business course training). Thus, the null hypothesis was:

H_0: The frequency of sales-price-based decisions will be equal among the groups.

The first alternative hypothesis was:

H_{A_1}: The frequency of sales-price-based decisions will be inversely related to the amount of accounting training.

However, if stimulus encoding dominates any interference effect, then the experimental groups might perform *as well as* or *better than* the control group. Such a result would be consistent with the retroactive facilitation findings in meaningful verbal learning studies. Therefore, a second alternative hypothesis (the null remained the same) was:

H_{A_2}: The frequency of sales-price-based decisions will be directly related to the amount of accounting training.

Two-tailed tests were employed because of the directional effect implicit in the competing theories.

Experimental Design

To test the above hypotheses, we constructed a scenario in which subjects were told that a distant relative had died and left them a choice between two unspecified durable goods. Subjects were told the amount that their relative had paid for each item at the time they bought it and the sales price (cash value today) for each, but otherwise the items were not described. They were told that both items had been purchased by their relative at the same time and that the sales prices were approximately what the item could be sold to others for today. Subjects were then asked to indicate, on the basis of the information provided, the item that they preferred. The cases were constructed so that one item had the higher sales price and the other had the higher purchase price. For example, in the case below, Item *B* has a higher purchase price but Item *A* has the higher sales price.

Item A

Purchase Price	*Sales Price*
3450	3850

Item B

Purchase Price	*Sales Price*
3500	3700

Thus a choice of *B* would indicate an interference effect.

An additional instrument adapted from Larcker and Lessig [1980] was used to determine the perceived usefulness of information for decision making. Using this instrument, subjects reported on a seven-point scale the usefulness of sales and purchase price information for their decisions.

A pilot study revealed that many subjects computed an "income measure" and subsequently used it to make their decisions. In other words, some subjects maximized the difference between the selling price and buying price. For example, if a subject chose Item *A* in the above example, it would be impossible to determine if the choice was because of the higher sales price of item *A* ($3850) or because Item *A* had appreciated more than Item *B* ($400 vs. $200). We therefore included separate check cases for fixation on an "income measure." The check involved cases where both the purchase and sales prices for one item were lower than the respective prices for the other item, but the difference between sales price and purchase price was larger for the lower-priced item.

For example, in the following case, only an "income user" would select Item *A* which has appreciated $600 vs. the appreciation of $200 for Item *B*.

Item A

Purchase Price	*Sales Price*
3200	3800

Item B

Purchase Price	*Sales Price*
3700	3900

By including "income user" check cases, we could determine whether the amount of appreciation or the absolute prices themselves influenced the decision. Three cases were used to determine whether a subject used this "income"-oriented decision rule. Thus, we were able to fully test whether subjects used an inappropriate cost-based decision rule, an inappropriate income-based rule, or an economically rational sales-price-based decision rule.

Secondary Hypotheses

Since the judgments involved wealth, two additional variables were considered. First, if the theory that subjects encode different aspects of the stimulus in differentiating between decision contexts is correct (as suggested by Tversky's and Khaneman's [1981] framing experiments and other tests of similarity [Tversky, 1977]), it is important that subjects be able to distinguish situations in which historical costs are appropriate from those in which sales prices are appropriate. While in theory these situations should be quite distinct, it may be that the numbers are so close that the situations become practically indistinguishable.

In accounting parlance, the materiality of the difference between the magnitudes involved may have an effect on the outcome. Accounting research on materiality judgments has shown that subjects generally exhibit differences of opinion with regard to whether or not an amount is considered material. Researchers have thus assumed that "different individuals have different materiality thresholds" [Moriarity and Barron, 1976, p. 321]. Tversky and Kahneman [1981] noted a materiality effect in their experiments on framing. They recognized a "temporary devaluation of money which facilitates extra spending and reduces the significance of small discounts in the context of a large expenditure" (p. 457). Specifically, a subject may not distinguish between the stimulus to use historical costs and the stimulus to use market prices because the response amounts are so close to each other that he/she perceives there to be no difference between them. Also, the subject may consider a difference insignificant by comparison to the magnitude of the sales price or purchase price amounts. Other research on functional fixation has discovered important materiality effects [Dopuch and Ronen, 1973; Abdel-khalik and Keller, 1979].

To test for materiality, a within-cell materiality variable was manipulated. All subjects were exposed to three levels of percentage differences between sales price and historical cost. In other words, the percentage difference in the dollar amounts between the higher sales price and the higher purchase price was established at levels of two, ten, and 20 percent for each subject.[2] The null hypothesis was that the level of materiality had no effect on which decision model the subjects used. There were six cases in each materiality level, including one "income user" check case. Thus, a total of 18 cases were presented in random order to each subject.

The second additional variable investigated was the subjects' perceived certainty of information accuracy. In an economic setting, the perceived quality of the information inputs may influence the decision. Specifically, subjects may rely on information they perceive to be harder (less subject to manipulation) even if it is an inappropriate stimulus. Kahneman and Tversky [1979] discuss, in their development of prospect theory, a key variable called "the certainty effect." They found their subjects consistently underweighted outcomes that were only probable as compared to outcomes that were certain. In other words, the expected value of a stochastic payoff is valued less than a certain sum equal to that expected value. To control for the effect of perceived certainty, each group was divided into two sections. One section received instructions indicating that the market price information was 100 percent certain (a buyer was already available at the quoted price). The other section was told that the market price information was reliable but not exact (the price was approximately what the item could be sold to others for; see Appendix). In this way we could test whether the perceived certainty of the data affected the presence of fixation.[3]

Data Analysis

The first step in the data analysis was to separate the subjects into "income users" and "nonincome users" on the basis of their answers to the three income user check cases. This was necessary because of the inability to distinguish sales price answers from income user answers except in the three check cases. If a subject's preferences on these cases indicated that he/she used an income measure on at least two of the three cases, he/she was deemed an "income user." All other subjects were deemed "nonincome users." All subsequent data analysis was performed separately for these two groups.

The 18 cases for each subject were analyzed using a $3 \times 2 \times 3$ factorial ANOVA with materiality as a repeated measures factor. The dependent variable was the number of sales-price-based decisions in each materiality level.

The analysis of the Larcker-Lessig

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[2] The first case example given was at the ten percent materiality level, that is, $.10*(3500)+3500=3850$. Conceptually, the higher sales price equals 110 percent of the higher purchase price.

[3] Kahneman and Tversky [1979] operationalized their certainty variable in terms of expected values. However, our certainty variable is categorical; certainty or uncertainty.

TABLE 1

Amount of Accounting Training	*Certainty*	*Materiality*
None (Control)	Certain	3 levels
	Uncertain	3 levels
Little (Experimental)	Certain	3 levels
	Uncertain	3 levels
Lot (Experimental)	Certain	3 levels
	Uncertain	3 levels

questions was performed via a 3×2 ANOVA for each of the five questions (three levels of accounting exposure versus two levels of certainty). It was not possible to examine the materiality repeated measure with regard to these questions because materiality was a within-cell factor. Here the dependent variable was the numerical response of the subject on a seven-point Likert scale with the endpoints and midpoint verbally anchored.

Subjects

Subjects were 220 undergraduates at two major midwestern universities. The subjects volunteered to spend some class time to respond to the experimental questionnaire. The experimenter distributed the questionnaire without comment and waited for the ten minutes it took most subjects to complete the questionnaire. The subjects were given a questionnaire package consisting of (1) the scenario, (2) 18 cases in random order requiring choice of an item, and (3) the modified Larcker-Lessig questionnaire (see Appendix). Subjects were also asked to indicate which accounting courses they had taken, whether they had held a full-time job for at least one year, whether they had prepared tax returns, which finance courses they had taken, and their age. These variables were later used as covariates in the analysis. Subjects were grouped into one control group (no accounting or business courses) and two experimental groups, two accounting courses and four or more accounting courses. Subjects in the two-course group had taken an introductory financial course and an introductory managerial course. Those in the four or more course group had all taken at least two intermediate courses and a cost accounting course.

Summary of Research Design

To summarize the research design, we followed the classic retroaction research design except that the number of groups was expanded. Table 1 details the design. All subjects were assumed to have learned the use of market prices through everyday experiences. Task 2, the use of cost and income data, was learned through exposure to accounting education. There was one control group (no accounting instruction). All subjects were exposed to all three materiality levels. For each level of accounting training, subjects were randomly assigned to the certain condition or the uncertain condition.

TABLE 2

MEAN NUMBER OF SALES PRICE DECISIONS ACCORDING TO AMOUNT OF ACCOUNTING, CERTAINTY, AND MATERIALITY LEVELS
FOR NONINCOME USERS
(STANDARD DEVIATIONS ARE GIVEN IN PARENTHESES)

	Accounting (Factor A) and Certainty (Factor C)						
Factor B	*No Accounting*		*2 Courses*		*4 or more courses*		
Materiality	*Uncertain*	*Certain*	*Uncertain*	*Certain*	*Uncertain*	*Certain*	*Marginal*
Level 1 20%	4.3750 (1.4083)	4.3333 (1.4975)	4.3043 (1.2946)	4.3000 (1.6255)	4.7826 (1.0426)	4.7391 (.7518)	4.4957
Level 2 10%	4.3125 (1.3525)	4.5000 (1.1678)	4.6087 (1.1176)	4.5000 (1.2773)	4.7391 (1.0538)	4.5652 (1.1995)	4.5556
Level 3 2%	4.3750 (1.3102)	4.2500 (1.4848)	4.3478 (1.2288)	4.3500 (1.5653)	4.3913 (1.4058)	4.2174 (1.6776)	4.3248
Marginal	4.3542	4.3611	4.4203	4.3833	4.6377	4.5073	
	$N=16$	$N=12$	$N=23$	$N=20$	$N=23$	$N=23$	

RESULTS

The first half of the results section will focus on the subsample of nonincome users. The second part of this section will make comparisons between the two sample partitions, i.e., between the income users and the nonincome users. The results are based, first, on an analysis of the number of sales price decisions made by the decision makers across the 15 nonincome cases, and second, on the answers to the adapted Larcker-Lessig instrument. Table 2 presents the mean and variance of the number of sales price decisions for each cell in our 3×2×3 ANOVA repeated measures design. A perusal of this table provides evidence that perhaps materiality had an effect on the decision makers' models. However, the effect of the amount of accounting exposure and degree of certainty is less obvious. Table 3 confirms the initial suspicions generated by Table 2. Analysis of variance tests for the equality of means $H_0{:}m_1=m_2=\ldots=m_l$ indicated that the level of accounting exposure and degree of certainty had no effect on the number of sales price decisions. However, the materiality effects were significant at the .05 level. There was a significant $(p<.05)$ interaction effect between the level of accounting exposure and materiality. The sample sizes across groups were not equal because we could not determine in advance who would be income users. The Greenhouse-Geisser [1959] adjustment was made to the ANOVA to compensate for this problem.

The implications of these results are as follows: (1) the larger the differences between the higher purchase price and the higher sales price, the more likely that the decision maker would choose the asset with the higher sales price; and (2) when materiality levels were higher, subjects with more accounting training made more sales-price-based decisions.

The ANOVA was run with several covariates to attempt to remove their

TABLE 3
ANOVA RESULTS FOR NUMBER OF SALES PRICE DECISIONS
NONINCOME USERS

Source	*df*	*Mean Square*	*F*	*Probability*
Accounting	2	1.52093	.34	.7158
Certainty	1	.23671	.05	.8197
Materiality	2	1.34996	4.50	.0155*
Accounting-Certainty Interaction	2	.13963	.03	.9697
Accounting-Materiality Interaction	4	.85814	2.86	.0298*
Certainty-Materiality Interaction	2	.04272	.14	.8672
Accounting-Materiality Certainty Interaction	4	.12584	.42	.7713

* Significant at $\alpha \leq .05$ after adjustment for Greenhouse-Geisser degrees of freedom

effect on the behavior of the dependent variable. The covariates were age, whether the subject had been employed for more than a year, whether he/she had prepared his/her own tax return, and the number of finance courses taken. The only covariate that produced a significant effect was age. The older the subject was, the less likely he/she was to make sales-price-based decisions.

A chi-square test confirmed the relationship between age and use of income- and cost-based decision rules. Older subjects were significantly ($p<.06$) less likely to use selling prices in making their decisions.[4] While this phenomenon is not directly related to the hypothesis, it does lend support to retroactive interference. This is the opposite of what one would expect *a priori*. One would expect that repeated consequences of erroneous decisions, those based on cost or income, would cause older subjects to move close to market price measures in this decision context. Since our results contradict this expectation, we suggest that the frequent use of cost and income data in evaluating decisions, and in the various economic situations already mentioned, may be so important as to negate expected reinforcement of market price behavior.[5]

Larcker-Lessig Instrument

Table 4 presents results of subject responses to the Larcker-Lessig instrument. Two ANOVAs (one for income users and one for nonincome users) were performed for each question from the Larcker-Lessig instrument. The manipulated variables were accounting and certainty. Consistent with retroactive facilitation or stimulus encoding for nonincome users, the more accounting

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[4] The chi-square test was performed on a contingency table of all subjects, sales price users against non-sales price users, for five age levels, 18 and under, 19, 20, 21, 22 and over. The null hypothesis was that age and the number of sales price users are independent.

[5] The age effect results should not be extrapolated to the general population since the average age of our respondents was 21.1. Further, the effect could be an experimental artifact and requires future research before these results can be viewed with confidence.

TABLE 4
RESULTS OF TWO-WAY ANOVA (ACCOUNTING × CERTAINTY)
ON LARCKER-LESSIG INSTRUMENT

Questions	*Nonincome Users* $N=117$	*Income Users* $N=103$
1. It is Difficult To Choose Without the Purchase Price	Accounting $p=.0033$* Mean $=2.9744$	No Significant Effect Mean $=4.6796$
2. It is Difficult To Choose Without the Sales Price	No Significant Effects Mean $=5.1880$	No Significant Effect Mean $=4.8835$
3. I Used Only the Purchase Price	Accounting $p=.0011$* Mean $=1.9658$	Accounting $p=.0318$* Mean $=1.8641$
4. I Used Only the Sales Price	No Significant Effects Mean $=5.0513$	No Significant Effects Mean $=2.1650$
5. I Used Both the Purchase Price and the Sales Price	No Significant Effect Mean $=3.6239$	No Significant Effect Mean $=6.1456$

* All p Values $\leq .05$ Reported

courses taken, the *less* likely these subjects were to agree that purchase prices were important for this decision context (questions 1 and 3, $p<.01$).

Forty-six percent of the subjects with no accounting courses, 53 percent of the subjects with two courses, and 40 percent of the subjects with four or more courses made decisions based on appreciation instead of prices. A chi-square test indicated that the percentage of income users did not differ significantly among groups. To provide evidence that the partition of the sample into income and nonincome users was justified, we performed a two-sample t-test on the mean responses to question #5 from the Larcker-Lessig instrument. Question #5 asked the subjects if they agreed that the purchase and sales price information both were necessary for their decisions. Obviously, for income users, both pieces of information are necessary, but for sales price users they are not. The test indicated that the mean response of the income user partition differed from the mean response of the nonincome user partition at the $p<0.0001$ level. Income users were more likely (by a difference of over 2.5 scale points) to agree that they used both the sales and purchase prices in their decisions.

Table 4 also includes the results of the ANOVA on the Larcker-Lessig instrument for the subjects who used income-based decision models. The only question that generated a significantly different response depending on the amount of accounting training for income users was #3, which asked the importance of the purchase price information for the subject's decision. The nonaccounting group was most likely to agree with the statement, the group with 4+ accounting courses next most likely to agree, and the middle group least likely. The latter two were almost identical in their responses (1.667 vs 1.710). The significant result was caused by the no-accounting group (2.458). The lack of a certainty effect for income users was interesting because it indicated that regardless of the "hardness" of the sales price information, the income user would not change his/her decision model in this context.

DISCUSSION

The results of this study did not support the proposition that exposure to accounting concepts via accounting courses interferes with decision processes. While retroactive interference was not confirmed by this research, some moderate support for stimulus encoding causing retroactive facilitation was found. As displayed in Table 3, the amount of accounting exposure did not affect the number of sales-price-based decisions. Also, as discussed earlier from Table 4, for nonincome users, the more accounting courses taken, the less likely the subject was to agree that purchase price information was important for the decision. Therefore, the interpolated learning of the accounting students did not interfere with original learning. Apparently, accounting training does not cause functional fixation in this simple wealth maximization setting.

Stimulus encoding was moderately supported. The accounting-trained subjects responded *as appropriate* to the decision setting, as did subjects with no such training. Furthermore, the accounting-materiality interaction provided weak support for stimulus encoding (framing) since accounting-trained users were more likely to make sales price decisions when the materiality differences were large. Apparently, students in the accounting-trained groups who were not income users were able to distinguish properly between the two stimuli in our hypothesized $A-B$ and $C-D$ response sets.

Confirmation of stimulus encoding was evident in the results on materiality. The materiality of the difference between the sales price and the purchase price was related to the number of sales-price-driven choices. Evidently, students in the nonincome group incorporated aspects of materiality into the decision context, and this affected their decision models. This aspect of the decision-making process was related to the amount of exposure to accounting and confirms results found by Tversky and Kahneman [1981]. Thus, stimulus encoding appeared to be contingent upon a materiality threshold.

It is noteworthy that nonincome users regarded sales price information as being significantly more important than the purchase price. Income users also considered sales price information as somewhat more important than purchase price information, but not significantly so.

A most interesting result was that approximately one-half of the sample was income users. That is, approximately half of the subjects were willing to choose a lower-valued item merely because it had appreciated faster in the past. Making the decision based on the "income" approach is dysfunctional since it overlooks the possibility of selling the higher-valued item and buying the other item for its appreciation potential while retaining the residual cash.

There are two possible explanations for our inability to reject the null hypothesis. One is that the interference effect does not exist, and the other is that accounting training is not a valid surrogate for exposure to cost and income concepts in this economic environment. The high number of "income users" in the sample (overall 47 percent; 103 out of 220) provides some evidence that exposure to the income concept through economic conventions such as taxes may be the cause of a fixation on income. The amount of accounting training did not affect this behavior. This result supports those found by Dopuch and Ronen [1973], Abdel-khalik and Keller [1979], and Kahneman and Tversky [1979] that income fixation is common.

Finally, the inverse relationship between age and number of sales-price-based decisions further suggests that the large amount of cost- and income-based data used in society may affect decision-making behavior by causing individuals to selectively attend to cost and income measures. Perhaps accounting training is not a good surrogate measure for learning of income- and/or cost-based rules, since accounting training is tempered with warnings about the irrelevance of cost-based data in most decision contexts. If age is a more appropriate surrogate for learning cost- or income-based rules, then this research provides some evidence of an interference effect.

LIMITATIONS AND FUTURE RESEARCH

This study, like all empirical research, is a joint test of the hypothesis under investigation and the research design. To explore the limitations of the research instrument, a pre-experimental inquiry [Orne, 1962] was conducted to assess the experiment's demand characteristics. A separate set of 50 subjects was given the experimental instrument and asked to speculate on the hypotheses under study. The majority of subjects (90 percent) participating in the inquiry were able to provide an accurate written description of the main objective of the experiment (e.g., "to determine how people value items"). None of the subjects were aware of the manipulation of the secondary experimental variables, that is, the materiality or certainty variables. This group of subjects was also asked, after their responses about the objectives of the study had been collected, how they would make the decisions. The responses were remarkably consistent with the experimental results. Forty-eight percent would have looked at the sales price, eight percent at purchase price, and 44 percent at appreciation. Since the responses to the inquiry were uniform and identical to the objective of the study, we are confident that the results were not driven by the construction of the experimental instrument.[6]

Other limitations were caused by our choice of a supporting theory. The adoption of a conditioning paradigm to explain decision making which contradicts normative theory has not been explored for this type of decision situation. This conditioning paradigm forces the researcher to choose a surrogate for the unobservable treatment effect of exposure to cost and income measures. We chose accounting courses to surrogate this treatment effect. However, given our results, perhaps age would have been a better surrogate. Future research could more thoroughly explore the impact of age in these decision contexts. The inverse relationship found between age and normatively correct decisions clearly indicates a need for further study. In addition, there are other methods that could be used to test the impact of exposure to cost- or income-based phenomena on wealth-related decisions. A more cognitive approach, such as that taken by Tversky and Kahneman, may prove fruitful. Another possibility would be to use process tracing in an attempt to understand the thought processes of people who appear to make suboptimal wealth-related decisions.

These results are clearly preliminary. If further research supports the results reported here, accounting educators need not fear that accounting education negatively affects the students' wealth maximization decisions. In fact, there is some evidence to indicate that accounting training facilitates the use of the normative model, particularly when the magnitude of the choice is relatively large. On the other hand, a large percentage of all three groups (46 percent) used an income-based decision rule, supporting the notion of a functional fixation on income. When one includes the decisions made based on purchase prices, more than 50 percent of the decisions made in this experiment were not in accordance with normative decision rules. These fixations appear to be environmentally induced and not a result of exposure to accounting courses. Subjects who had not been exposed to formal accounting training used decision rules which were not normatively "correct" about half the time. Furthermore, older subjects, who presumably have experienced more exposure to the institutional environment, were significantly less likely to make sales-price-based decisions. The implication of these results may be that economic institutions which use accounting data for everything from taxation to job evaluation, may cause a fixation phenomenon in a substantial portion of the population. Accounting training does not seem to affect this fixation. The price of these fixations could be suboptimal decision-making behavior by society's participants, which may exact a high price in terms of an efficiently functioning economy. Additional research is needed to either confirm or deny this effect.

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[6] Experimental design flaws have been investigated by five separate trials of the experiment with changes in the instrument in each iteration. To check for biases, the scenario was changed to a game show format in one trial and no format (i.e., just choose an item) in another trial; the "Purchase Price" and "Sales Price" titles were changed to "Historical Cost" and "Market Value" in one trial and to "Amount your relative paid for the Item" and "Amount for which you can sell the Item" in another; and finally, the uncertain scenario was manipulated by stating "the sales price is the average of the classified ad prices listed in the newspaper." In all trials, between 40 percent and 50 percent of the subjects used an income measure as the basis for their choice. In addition, the certainty manipulation was significant for the trial using "classified ads" at the .05 level.

Perhaps the most significant results of this research are the high percentage of income users in the sample population and the relationship between age and cost- or income-based decisions. Future research should attempt to understand why people make income- and cost-based decisions, and what environmental influences seem to encourage these phenomena.

APPENDIX

CERTAIN SCENARIO

You have just been informed that you have been mentioned in a distant relative's will. The terms of the will are that you are to have the choice between two items. Both items are durable goods that are commonly available. Each item was purchased by your relative at the same time. The amount listed as "Purchase Price" is the amount your relative actually paid for the item. The executor of the estate has agreed to buy back any item if you choose to sell. He will pay you the amount listed as "Sales Price," which is the appraised value of the item and approximately what you could sell the item to others for. The relative's estate will pay any taxes that are due. You will receive the item you choose immediately after you make your choice. On the basis of the information presented in each of the following 18 cases, please indicate which item, A or B, you choose to receive.

If you have any questions about this questionnaire or the instructions for its completion, please ask.

UNCERTAIN SCENARIO

You have just been informed that you have been mentioned in a distant relative's will. The terms of the will are that you are to have the choice between two items. Both items are durable goods that are commonly available. Each item was purchased by your relative at the same time. The amount listed as "Purchase Price" is the amount your relative actually paid for the item. The amount listed as the "Sales Price" is the appraised value of the item which is approximately what you could sell the item for. The relative's estate will pay any taxes that are due. You will receive the item you choose immediately after you make your choice. On the basis of the information presented in each of the following 18 cases, please indicate which item, A or B, you choose to receive.

If you have any questions about this questionnaire or the instructions for its completion, please ask.

EXAMPLE OF A CHOICE AT 10% MATERIALITY LEVEL

B3

ITEM A		*ITEM B*	
Purchase Price	*Sales Price*	*Purchase Price*	*Sales Price*
$3,450	$3,850	$3,500	$3,700

Please place an X next to the ITEM you prefer.

ITEM A ______________

ITEM B ______________

MODIFIED LARCKER LESSIG QUESTIONNAIRE

Please circle the number indicating your agreement with these questions.

		Completely Disagree		*Neutral*		*Completely Agree*	
A. It would be difficult for me to choose an item without the purchase price information.	1	2	3	4	5	6	7
B. It would be difficult for me to choose an item without the sales price information.	1	2	3	4	5	6	7
C. I used only the purchase price information to make my decision.	1	2	3	4	5	6	7
D. I used only the sales price information to make my decision.	1	2	3	4	5	6	7
E. I used both the purchase price and the sales price information to make my decision.	1	2	3	4	5	6	7

Are you a graduate student?	yes	no
Are you a business major?	yes	no
Have you ever taken any business courses?	yes	no
Have you had a *full time* job for one year or longer?	yes	no
Have you filed tax returns that you have prepared yourself?	yes	no

Circle the accounting courses, if any, you have taken (or the equivalent).	240	241	510	610	517
	609	616	605	851	608
	others ____________________				
Circle the finance courses you have taken (or the equivalent).	478	624	others __________		

Age ______

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Intra-Year Trends in the Degree of Association Between Accounting Numbers and Security Prices

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ABSTRACT: This study uses two representative cross-sectional valuation models to examine trends in the explanatory power of given sets of financial data for security prices. The primary objective is to examine joint hypotheses on the validity of valuation models and the manner in which financial statement data are assimilated into the information set reflected in prices, and subsequently replaced by other data. The observed trends support the informativeness trend hypotheses, suggesting that the valuation models studied capture important elements of the security pricing relationship. An examination of intra-year movements showed substantial variation around the trends, suggesting the presence of temporary influences on model explanatory power. Possible explanations for these phenomena are offered.

THIS paper examines empirical hypotheses on the relationship between the age of accounting data and the relevance of the data for explaining security prices. This aging hypothesis asserts that accounting information is increasingly reflected in prices as the reporting date approaches; after the reporting date, the data become less and less relevant for explaining security prices. In addition to providing direct evidence on this issue, the study also sheds light on some properties of valuation models.

Considerable interest in the relationship between security returns and accounting data was generated by the results in Ball and Brown [1968]. Their results showed that (unexpected) changes in firms' earnings are accompanied by corresponding unexpected returns as measured by the market model. The results also suggested that essentially all of the price movement occurred before and with the earnings announcement.[1]

Ball and Brown's analysis was designed to examine the relationship between deviations of earnings from expectations and firm-specific security price adjustments. Their results provide only indirect evidence on the nature of the relationship between security prices and accounting

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[1] Some recent studies suggest that the adjustment of prices to accounting information is not instantaneous. The post-announcement drift phenomenon for quarterly earnings has been studied by several authors. See Rendleman, Jones and Latané [1982].

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(particularly earnings) information and the way this relationship changes over time. This study examines this issue directly by focusing on the security valuation relationship and its development up to and after the annual statement publication date. The set of annual financial statements would be expected to be most relevant for explaining security prices at about the report publication date. At this time the information is fairly current and is publicly available. Prior to this point, the information may not be fully reflected in prices; after publication, the information would become obsolete with the arrival of new information and should gradually lose relevance for the explanation of security prices.

A number of recent studies have examined accounting issues using cross-sectional valuation models. These studies include Bowen [1981], Beaver and Landsman [1983], and Daley [1984]. This paper attempts to extend valuation model research by examining trends in the degree of association between accounting information and security prices in periods up to and subsequent to the disclosure of financial statement information. The results are useful in determining whether valuation model explanatory power behaves in an intuitively appealing way, regardless of the behavior of model coefficients.

The renewed interest in valuation models suggests a need to examine the properties of the models in order to assess their appropriateness for examining various specific accounting issues. In questioning the relative paucity of cross-sectional valuation studies, Lev and Ohlson [1982, p. 306] emphasize that the usefulness of the cross-sectional valuation approach depends on the construction of credible stock valuation models. One of the most important and basic characteristics of a valuation model is its explanatory power. Obviously, for a model to be credible, it must provide non-spurious explanation of the variable of interest. More importantly, changes in model explanatory power over time can offer important clues about model validity. This study provides some evidence on the validity of cross-sectional models; if the models' explanatory power behaves in an intuitively appealing manner over time, it would suggest that the models represent pricing relationships in a substantive manner.

The properties of valuation model explanatory power are also of practical importance in estimation. Valuation models are typically estimated after deflation by such variables as book value to reduce heteroscedasticity. However, it has been argued that this procedure may lead to induced correlation and spurious inference, since the deflating variable appears on both sides of the equation. For example, Beaver and Landsman state [1983, pp. 77–78]:

> Using a common deflator on both sides of the regression equation can lead to biased regression coefficients and an R^2 that reflects the cross-sectional differences in the deflator as well as the relationship between the undeflated dependent and explanatory variables.

While Beaver and Landsman were primarily concerned with comparisons of regression equations estimated with different deflating variables, the issue of induced correlation is an important one. This paper provides a test of whether deflation-induced spurious correlation threatens valuation model validity. If induced spuriousness is predominant, then the observed explanatory power should remain the same at different times, as long as the deflating data are unchanged. On the other hand, if the observed correlation is not spurious, one would expect to observe a progressively weaker association between prices and a given set of accounting data with the passage of time from the reporting date.

Although it is hypothesized in this paper that the primary cause of changes in the explanatory power of a given set of financial data for security prices is the age of the data, it is likely that there are other influences as well; overall model explanatory power may change in response to events that affect large groups of companies. For example, in a period of uncertainty about interest rates, accounting data may be of reduced importance in comparison to firms' degrees of sensitivity to interest rate changes. At such times, valuation models may show reductions in explanatory power for reasons unrelated to the aging of data. Although the influences of economy-wide events on security prices are quite complex, the existence and effect of such influences can be detected by studying specific price histories both as pre-report and post-report price series for successive financial statements. Changes in valuation model estimates over time have long been of concern to researchers. However, such year-to-year changes result from changes in both the set of prices and in accounting data. The examination of changes in model properties resulting solely from price changes may be useful for understanding long-term changes in models. From this perspective, the documentation of non-aging influences on model explanatory power is a useful step in the study of causes of changes in model estimates over longer periods.

In the next section the method used to examine the suggested relationships is discussed. The results are presented in the section after that, and some concluding comments are made in the last section.

RESEARCH METHODS

The Security Valuation Models

Although there is little agreement on the correct formulation of the security pricing relationship, most models used in the literature express price as a function of earnings, growth, and risk. The model is typically deflated by the book value of equity or of assets. The empirical formulations of the models are therefore more closely related than their origins would suggest. A representative and widely used model was proposed by Litzenberger and Rao (LR) [1971]. This model and derivative versions have been used in such studies as Dukes [1976], Foster [1977], Bowen [1981], and Daley [1984] and forms the basis for one of the two models used in this study. To assess the generality of the results outside the LR framework and to evaluate the role of earnings information in particular, the estimation was also performed using a model in which earnings was the only explanatory variable. The similarity of the results obtained suggests that the phenomena are manifested in the most basic (price-earnings) valuation models.

Details of the derivation of the LR model can be found in Litzenberger and Rao [1971] and Bowen [1981]. LR derive their model by combining the Sharpe-Lintner-Mossin capital asset pricing model (CAPM) for the valuation of non-growth "normal" earnings and the Modigliani-Miller (MM) model for the valuation of the growth component of expected earnings.

The authors express the price of the firm as

$$P_i = \alpha_1 E_i + \alpha_2 S_{Ei} + \alpha_3 \frac{\Delta B_i(\pi_i - R_i)}{R_i(1+R_i)},$$

where

P_i = firm market value,

E_i = current period accounting earnings,
S_{Ei} = standard deviation of accounting earnings,
ΔB_i = change in book value of total common stock (growth),
R_i = Required rate of return of equity investment,
π_i = Rate of return on new investment, and
$\alpha_3 = T$, number of years over which above-normal returns on new investment are expected.

A modified version of the LR model is

$$P_i=\alpha_1 E_i+\alpha_2\beta_i+\alpha_3\Delta B_i\pi_i+\alpha_4\Delta B_i.$$

This formulation uses the CAPM β instead of the standard deviation of earnings. The former is more readily computed and is a well-motivated measure of risk. The growth expression is also broken up into a component related to the firm's recent rate of return (π_i) and one that reflects the rate of book value growth only.

The coefficients α above correspond to identifiable quantities:

$\alpha_1=1/I$, I=risk-free rate of return;

$\alpha_2=\dfrac{E_m-\mathrm{IP}_m}{\sigma^2_m I}k$, some $k>0$, where m denotes a market quantity;

$\alpha_3=\dfrac{T}{R(1+R)}$, T and R are assumed to be common to all firms; and

$$\alpha_4=-\frac{T}{(1+R)}.$$

Given the simplifications used in the derivation of the model and measurement of the variables, only a rough correspondence would be expected between the theoretical and the estimated coefficients.

Other researchers have arrived at similar formulations using alternative approaches. These include Beaver and Landsman [1983], whose variables include earnings, CAPM β, and earnings or book value growth. To provide benchmark results for a more straightforward model, estimation results for a model without the earnings growth and risk measures are also presented. Both models were deflated by the book value of common equity to reduce heteroscedasticity.[2] Alternative deflating variables are sales and total assets.

The above considerations led to the derivation of valuation models expressible as

Model 1:

$$\frac{P_i}{B_i}=\alpha_{10}+\alpha_{11}\frac{E_i}{B_i}+u_{1i}$$

Model 2:

$$\frac{P_i}{B_i}=\alpha_{20}+\alpha_{21}\frac{E_i}{B_i}+\alpha_{22}\beta_i+\alpha_{23}\frac{\Delta B_i\pi_i}{B_i}+\alpha_{24}\frac{\Delta B_i}{B_i}+u_{2i}$$

The variables were computed as follows:

P_i/B_i = current ratio of market value to common equity for firm,
E_i = current accounting earnings,
β_i = estimate of CAPM beta from 60-month regression of firm returns on market returns,

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[2] Deflation resulted in a substantial reduction in heteroscedasticity. Under the Goldfeld and Quandt [1965] test, the hypothesis of homescedasticity in the undeflated version of model 2, based on prices at the end of March each year, was rejected at less than the .01 level in all the periods studied. After deflation, the null hypothesis could not be rejected at the .01 (.05) level in six (3) of the ten years studied. β is included as an undeflated variable in the regression equation (model two). All the variables in the equation are therefore scale-independent or ratio measures.

TABLE 1

DISTRIBUTION OF WALL STREET JOURNAL EARNINGS ANNOUNCEMENTS BY MONTH: 100-FIRM RANDOM SAMPLES

Announcement Month	Year 1971	1976	1980
January	23	30	31
February	58	54	57
March	17	15	10
April	2	1	2
Sample Size	100	100	100

ΔB_i = four-year average of the growth of common equity, and

π_i = three-year average of return on common equity.

Measurement of Trends in Explanatory Power

To evaluate the informativeness trend hypothesis, this research evaluates the trends in explanatory power for the valuation models described above. The main measure of interest was the coefficient of determination (R^2). The question posed was: how does the coefficient of determination, measured for a given set of financial data, change as the set of data is used in explaining prices at different times?

A survey of annual earnings announcement dates in *The Wall Street Journal* indicated that almost all such announcements for December 31 year-end companies are made by the end of March. The timing of earnings announcements in the years 1971, 1976, and 1980 as recorded in *The Wall Street Journal Index* is shown in Table 1 for random samples of 100 firms with December 31 year-ends. Since one could generally be certain that most companies' financial results had at least been released (if not reflected in prices) by the end of March, it was decided to use March 31 as a cut-off date. Thus, to examine the trend in the explanatory power of, say, December 1978 data before the balance sheet date, the series of month-end prices from January 1978 to March 1979 was studied. To examine the trend after the statements were issued, the series of month-end prices from January 1979 to March 1980 were examined. Under the hypotheses presented in this paper, we would expect a positive trend in explanatory power before the March 1979 date and a negative trend for the January 1979 to March 1980 prices. The pre-report and post-report periods for the December 1978 financial statements are shown below:[3]

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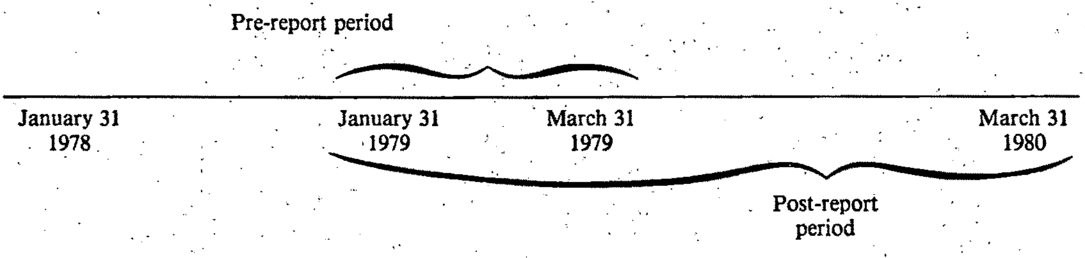
[3] The measurement periods overlap in the January to March period. Essentially the same results are obtained if January to December or April to March measurement periods are used for both the pre-report and the post-report periods.



The estimation was based on the series of month-end prices over the period January 1971 to March 1981. This permitted the examination of trends over nine pre-report and ten post-report periods.

To examine the direction and strength of trends in explanatory power in the periods examined, a regression was run based on the coefficient of determination (R^2) with time in months since the balance sheet date (age of financial statements) as the explanatory variable. In the above example, January 1978 would be month one in the pre-report period (March 1979 = month 15) and January 1979 month one in the post-report period (March 1980 = month 15). R^2 could not be used in the regression (if the regression statistics were to be interpreted easily), since this variable is not normally distributed. An approximately normally distributed variable z was obtained by making the following transformation (see Harnett [1975, pp. 401–403]):

$$z = log_n[(1+R)/(1-R)].$$

z was then used in a regression of the form

$$z_t = \gamma_o + \gamma_1 t + \epsilon_t,$$

where t = time in months.

The validity of the above test depends on the appropriateness of the parametric assumptions made. Additional tests are conducted using distribution-free methods. The primary hypotheses posit monotonic increases and decreases in model explanatory power in the pre-report and post-report periods, respectively. This can be examined directly using the relative rank of each month's R^2 in the 15-month pre- or post-report series. The Spearman rank correlation coefficient between R^2 for the month and the month index (January = 1, March of the following year = 15) measures the systematic trend in the series of model explanatory power.

MEASUREMENT ISSUES: THE COEFFICIENT OF DETERMINATION

The first issue examined is the appropriateness of the R^2 measure. This measure was chosen primarily because it is an intuitive measure of the model's success in explaining variations in the dependent variable. The discussion below provides further motivation for expecting R^2 to measure changes in the relevance of a given set of accounting data for the explanation of prices.

At any point in time prices are assumed to reflect all publicly available information on each company. Furthermore, it is assumed that information arrives in the public domain continuously, and that the set of information at any time includes the sets of information at earlier times. Denote (all) the information relevant to the formation of prices at time t by X_t:

$$P_t = X_t\alpha_t + \epsilon_t.$$

At time $s > t$, we have

$$P_s = X_s\alpha_s + \epsilon_s,$$

where we assume that

(1) X_t and X_s are comprised of different values of the same variables (e.g., earnings in a one-variable model),
(2) $\sigma_t^2=\sigma^2$ for all t, and
(3) Var (P_t) is constant for all t.

X_s can (trivially) be decomposed into a component in the same linear space as X_t, Z_s, and a component Δ_s with vectors linearly independent of X_t:

$$Z_s=X_t(X_t'X_t)^{-1}X_t'X_s$$

$$\Delta_s=(I-X_t(X_t'X_t)^{-1}X_t')X_s.$$

Let $\delta_s=\Delta_s\alpha_s$, assumed to be independent of ϵ_t.

Now compare regressions of P_t and P_s, respectively, on X_t:

$$\hat{P}_t=X_t\hat{\alpha}_1+\hat{\epsilon}_t$$

$$R^2_{t\cdot t}=1-\frac{\epsilon_t'\epsilon_t}{\overline{P_t'}\overline{P_t}}$$

$$\hat{P}_s=X_t\hat{\alpha}_2+\hat{\epsilon}^*$$

$$R^2_{s\cdot t}=1-\frac{\hat{\epsilon}^{*\prime}\hat{\epsilon}^*}{\overline{P_s'}\overline{P_s}}$$

where $R^2_{j\cdot k}$=coefficient of determination for prices at time j based on information set at time k

$$\epsilon^*=\epsilon_s+\delta_s$$

$$\overline{P_j}=P_j-E(P_j)$$

Since Δ_s is not in the same linear space as X_t, the error term is augmented by the additional term δ_s.

By assumption, the terms δ_s and ϵ_s in ϵ^* are uncorrelated, and $\overline{P_t'}\overline{P_t}=\overline{P_t'}\overline{P_s}$. Consequently the regression of P_s on X_t yields a lower coefficient of determination than does the regression of P_t on X_t. More precisely,

$$\text{plim}\,R^2_{t\cdot t}=1-\frac{\sigma^2}{\text{var}\,(P)}$$

$$\text{plim}\,R^2_{s\cdot t}=1-\frac{\sigma^2+\text{var}(\sigma_s)}{\text{Var}\,(P)}$$

and we have[4] plim $R^2_{t\cdot t}>$plim $R^2_{s\cdot t}$.

The preceding analysis outlined plausible circumstances under which it may be reasonable to expect lower explanatory power for a given set of financial data at points in time other than the data release date. But what about the relative levels of explanatory power for two sets of prices at different points before or after the financial reporting date? It is conjectured here that the information reflected in prices becomes increasingly different from a given set of financial statements with time from the reporting date. For measurement purposes, δ_s for successive points s becomes a metric of this difference. It is assumed that $\delta_s'\delta_s$, the sum of the squares of elements of δ_s, increases with time (in either direction). Since $\delta_s=\Delta_s\alpha_s$ this appears to be a reasonable assumption.

The above discussion suggests that the coefficient of determination is a reasonable index of changes in the degree to which given sets of information are reflected in prices. A second measurement issue concerns the use of a deflating variable. While the discussion above was phrased in terms of prices, the model estimated was deflated by book values of common equity. The deflation is to reduce heteroscedasticity and essentially weights the observations on the basis of (a proxy for) their error variances. Although the issue of spurious correlation has been raised regarding deflation, it would seem to be moot given the documentation of relationships between accounting variables and prices. In any case, it is not clear how relevant this argument is in the comparison of coefficients of determination from two regressions that are deflated by the same set of deflators. To confirm this, trends in explanatory power were re-examined based on two measures of average deviations of actual from predicted prices:[5]

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[4] Note that the assumption of zero correlation among the terms in ϵ_t^* is not the weakest assumption possible. All that is needed for $R^2_{t\cdot t}>R^2_{s\cdot t}$, given constant price variance, is var$(\epsilon_s)+2$ cov$(\delta_s, \epsilon_s)>0$.

Measure 1:

$$M1=\frac{1}{N}\sum_{i=1}^{N}\frac{|\hat{P}_i-P_i|}{P_i}$$

Measure 2:

$$M2=\frac{1}{N}\sum_{i=1}^{N}\left|\log\frac{|\hat{P}_i|}{P_i}\right|$$

where $\hat{P}_i$ = predicted price for firm i,
and
N = number of firms in sample.

M1 is simply the absolute deviation of the predicted dependent variables retransformed to prices, while M2 is designed to be independent of which variable (predicted or actual price) is in the denominator. These measures would be expected to decline in the pre-report period and increase in the post-report period. The measures were compared with the R^2 measures for selected periods, and the two approaches were found to yield similar results. For the sake of brevity, only the R^2 results are presented in this paper.

Other Measurement Issues

An important issue is raised by the fact that the stock market has different levels of volatility or price variance at different times. This may be the result of economy-wide events which affect the valuation relationship temporarily. Examples are events that lead to broadly based bull or bear markets. Consequently, there may be variations in the strength of the valuation relationship over time solely because of variations in market-wide volatility. Such changes could be unrelated to the trends in explanatory power resulting from the aging of information and could potentially obscure such relationships as may exist.

A related issue is that there may be valuation-relevant data from sources other than accounting statements (e.g., macroeconomic data) in the course of the year. Such data could overshadow companies' financial characteristics and thereby reduce the explanatory power of the accounting data at various times. This could obscure trends related to the aging of accounting data. For example, it is possible that in times of high interest rates and unavailable credit, the valuation model's explanatory power would decline. Companies' prospects—and indeed their chances of surviving the crisis—are likely to be more closely related to their liquidity and financing prospects than to past growth or current earnings. However, if conditions improved, the valuation model variables could become the key valuation-relevant variables again, and one would observe a recovery in model explanatory power related more to temporary conditions than to the aging of data. As mentioned, the presence of such temporary influences on prices can be examined by comparing specific price series as pre- and post-report data. Temporary trends should affect both series similarly, but be superimposed on oppo-

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[5] These measures were suggested by James Ohlson in private communication.

TABLE 2

SUMMARY OF SAMPLE STATISTICS—POST-REPORT SAMPLE

December 31	P/B		E/B		β		$\Delta B/B$		$\Delta B.\pi/B$		Sample Size
	μ	σ	μ	σ	μ	σ	μ	σ	μ	σ	N
70	2.12	1.77	.09	.08	1.21	.41	.13	.13	.017	.022	371
71	2.25	2.12	.09	.06	1.25	.43	.13	.15	.016	.022	393
72	1.89	2.12	.11	.05	1.26	.44	.11	.12	.014	.018	406
73	1.42	1.43	.12	.05	1.32	.45	.10	.11	.014	.019	429
74	1.19	1.13	.12	.07	1.16	.35	.12	.11	.017	.019	406
75	1.40	1.03	.11	.07	1.19	.38	.12	.10	.017	.019	397
76	1.24	.79	.13	.06	1.19	.36	.12	.11	.018	.021	401
77	1.26	.70	.13	.06	1.20	.38	.12	.10	.018	.020	414
78	1.19	.74	.14	.07	1.15	.37	.13	.10	.020	.019	424
79	1.11	.82	.15	.08	1.28	.42	.15	.11	.025	.024	420

Notation: μ=mean
σ=standard deviation
P=market value of firm
E=current period accounting earnings
β=estimate of CAPM beta
π=rate of return on equity
B=book value of common equity
ΔB=4-year average of growth of common equity.

site aging trends. The presence of these influences is studied below.

One reason why the hypothesized trend could be weak or absent is that some of the valuation model explanatory variables are based on several years' data. The effect of any given year's financial statements is therefore not as powerful as it could be, since the annual data are only a single set of observations in the computation of averages. Any effects of this phenomenon should be more pronounced in model two than in model one, in which current net income is the sole explanatory variable. In spite of these potential problems, the results obtained showed definite pre-and post-report trends in virtually all the periods examined.

Sample Selection

The estimation was based on financial statement data for the years 1970 to 1979. The most important selection criteria were:

1. December 31 year-end
2. Non-financial company
3. New York Stock Exchange and COMPUSTAT listings
4. Five-year history of data on COMPUSTAT

The year-end criterion was imposed to facilitate comparison of firms with financial statement data that are of about the same age. Financial companies were excluded from the sample because of major differences between such companies' characteristics and those of other companies. The five-year criterion was imposed because the computation of the growth and security risk (β) variables required several observations.

In addition to the above criteria, companies with valuation model variable

TABLE 3

TRENDS IN EXPLANATORY POWER: 15-MONTH POST-REPORT PERIOD JANUARY TO MARCH: MODEL 1

UNADJUSTED R^2 FROM MODEL $\frac{P_t}{B_t}=\alpha_{10}+\alpha_{11}\frac{E_t}{B_t}+u_{it}$

	1971	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Observations	371	393	406	429	406	397	401	414	424	420
Jan	.338	.406	.445	.369	.275	.350	.474	.365	.399	.276
Feb	.329	.401	.424	.371	.269	.353	.442	.375	.386	.261
Mar	.319	.395	.419	.382	.268	.348	.437	.377	.384	.304
Apr	.311	.391	.416	.379	.270	.348	.452	.396	.385	.306
May	.309	.378	.398	.372	.271	.371	.459	.381	.369	.315
Jun	.311	.380	.383	.369	.273	.375	.455	.374	.348	.281
Jul	.317	.376	.383	.372	.284	.361	.439	.346	.366	.270
Aug	.321	.378	.384	.360	.292	.356	.428	.349	.365	.270
Sep	.318	.377	.393	.368	.302	.360	.412	.343	.332	.241
Oct	.319	.365	.376	.330	.283	.362	.412	.361	.326	.247
Nov	.310	.372	.343	.329	.271	.374	.418	.352	.352	.247
Dec	.312	.357	.325	.330	.282	.388	.415	.351	.268	.252
Jan	.293	.349	.325	.369	.284	.405	.389	.342	.245	.255
Feb	.289	.342	.330	.362	.284	.406	.393	.334	.210	.257
Mar	.287	.334	.317	.365	.277	.405	.393	.319	.257	.256

characteristics that differed markedly from those of the remainder of the sample were eliminated. An analysis of residuals in preliminary research showed that such companies were not described well by the model. The selection limits were determined from the preliminary analysis and were applied uniformly in all years. This only resulted in the elimination of between four and 13 companies in each year out of an average annual sample of approximately 410 firms. A number of companies were eliminated in more than one year: overall, 30 companies were eliminated at least once in the ten-year period studied. *Moody's Investment Handbook* was examined for the eliminated companies, and any unusual circumstances were identified in each case.[6]

Between 360 and 430 firms with December 31 year-ends satisfied the data availability criteria for each year. The composition of the sample changed depending on whether pre-reporting or post-reporting price series were being examined. However, the sample characteristics were similar in both cases. Sample statistics are presented in Table 2 for the post-report sample (with prices for the month of March).

RESULTS OF ESTIMATION

Valuation model coefficient estimates for March 1971 to 1980 are reported in Tables A1 and A2 of the Appendix for both models. With the exception of the coefficients of β, the estimates are of the predicted signs and approximate magnitudes. The model estimates are consistent with those obtained in previous research.

Intra-Year Trends: Post-Report Period

The first estimation exercise performed was an examination of the behavior of

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[6] Examples are high losses and negative growth for Twentieth Century Fox in the early 1970s and the amortization of L1011 Tristar start-up costs for Lockheed in the mid 1970s.

TABLE 4

TRENDS IN EXPLANATORY POWER: 15-MONTH POST-REPORT PERIOD JANUARY TO MARCH: MODEL 2

UNADJUSTED R^2 FROM MODEL $\frac{P_t}{B_t}=\alpha_{20}+\alpha_{21}\frac{E_t}{B_t}+\alpha_{22}\beta_t+\alpha_{23}\frac{\Delta B_t\pi_t}{B_t}+\alpha_{24}\frac{\Delta B_t}{B_t}+u_{2t}$

	1971	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Observations	371	393	406	429	406	397	401	414	424	420
Jan	.476	.504	.528	.495	.443	.494	.541	.450	.468	.329
Feb	.469	.502	.509	.491	.439	.502	.526	.459	.452	.316
Mar	.459	.499	.504	.498	.449	.492	.515	.460	.453	.366
Apr	.450	.500	.494	.491	.454	.494	.523	.477	.455	.370
May	.451	.490	.476	.476	.454	.516	.525	.458	.432	.375
Jun	.447	.493	.458	.474	.447	.512	.520	.452	.408	.340
Jul	.447	.482	.465	.468	.447	.496	.500	.417	.425	.321
Aug	.448	.488	.463	.451	.449	.482	.483	.421	.420	.314
Sep	.448	.485	.472	.460	.456	.485	.474	.417	.377	.281
Oct	.447	.489	.451	.428	.450	.483	.480	.427	.368	.293
Nov	.432	.495	.409	.433	.449	.497	.487	.409	.341	.298
Dec	.431	.489	.387	.441	.452	.511	.485	.411	.295	.302
Jan	.417	.477	.385	.473	.457	.524	.465	.402	.272	.306
Feb	.411	.465	.390	.466	.461	.517	.461	.399	.234	.311
Mar	.409	.459	.372	.464	.451	.504	.452	.389	.291	.303

the month-end valuation model over the 15-month period extending from January of the period following the financial statement period to March of the succeeding period. The objective was to characterize the behavior of the valuation models from a point prior to the publication of financial statement information through the release and aging of the information up to the point where it is replaced—or supplemented—by a new set of financial statements. *A priori*, we would expect the highest level of association with prices at the point of information release, and we would expect a decline as the information in the statements became obsolete.

The estimation was performed for models 1 and 2. The trends in explanatory power are summarized in Tables 3 and 4. Note that the estimation was based on financial statements for the years 1970 to 1979. Post-report price series therefore begin with the January 1971 to March 1972 series (1971 data in Tables 3 and 4) and end with the January 1980 to March 1981 series (1980 series in the tables).

Although a trend in the models' explanatory power is not evident in all of the years studied, closer examination reveals that there is often a pervasive negative trend in explanatory power over the 15-month periods studied. To investigate this question, a regression was run based on the transformed coefficient of determination, z:

$$z_t=\gamma_0+\gamma_1 t+\epsilon_t$$

where t = time in months.

The results of the estimation are shown in Table 5.

The results offer strong support for the hypothesis of declining explanatory power for a given set of financial statements with the passage of time. Eight of the ten annual time coefficients are negative for each of the models, with only

TABLE 5
ESTIMATION OF TRENDS IN EXPLANATORY POWER OF VALUATION MODELS: JANUARY TO MARCH OF SUCCEEDING YEAR

	Post-Report Period	
Year	*Coefficient of Time**	*t-Statistic*
Model 1		
1971	−.007	−4.87
1972	−.012	−13.54
1973	−.023	−13.19
1974	−.005	−2.11
1975	.003	1.82
1976	.011	6.01
1977	−.014	−7.83
1978	−.010	−5.04
1979	−.033	−9.44
1980	−.009	−2.99
Model 2		
1971	−.011	−10.65
1972	−.007	−5.67
1973	−.029	−12.97
1974	−.010	−3.29
1975	.002	2.96
1976	.003	1.23
1977	−.016	−10.44
1978	−.015	−7.68
1979	−.042	−10.48
1980	−.011	−2.95
	t(10%)	1.77
	t(5%)	2.16
	t(1%)	3.01

* This is the estimate of γ_1 in the regression $z_t=\gamma_0+\gamma_1 t+\epsilon_t$, where z=transformed R^2 from Tables 3 and 4, and t=time in months.

1975 and 1976 displaying positive drifts in explanatory power. Six of the negative coefficients in model one are significant at the one percent level. The model two results show seven of the nine negative coefficients to be significant at the one percent level. The positive coefficient for 1975 is statistically significant at the five percent level in model two, while that for 1976 in model one is significant at the one percent level. Neither of the remaining positive coefficients is significant at the five percent level. These anomalous results are further examined below in the comparison of the pre- and post-report periods. The regression results above are corroborated by the rank correlation tests, reported in Table 6. The parametric and the distribution-free tests give similar results for the direction and strength of explanatory power trends.

In light of the above results, it appears reasonable to conclude that given sets of financial information become less relevant for the explanation of security prices as time passes—that is, information appears to age and become obsolete. This result is interesting in its own right, but

TABLE 6

SPEARMAN CORRELATION COEFFICIENTS (ϱ) BETWEEN R^2 IN POST-REPORT PERIOD AND MONTH INDEX

	Model 1		*Model 2*	
	ϱ	*Significance Level**	ϱ	*Significance Level**
1971	(.69)	.005	(.96)	<.001
1972	(.98)	<.001	(.84)	<.001
1973	(.96)	<.001	(.96)	<.001
1974	(.67)	.007	(.73)	.002
1975	.56	.03	.61	.02
1976	.85	<.001	.36	.19
1977	(.88)	<.001	(.92)	<.001
1978	(.81)	<.001	(.90)	<.001
1979	(.95)	<.001	(.96)	<.001
1980	(.67)	.007	(.69)	.004

* Test of hypothesis $\varrho=0$ against alternative $\varrho\neq0$.

TABLE 7

TRENDS IN EXPLANATORY POWER: 15-MONTH PRE-REPORT PERIOD JANUARY TO MARCH: MODEL 1

UNADJUSTED R^2 FROM MODEL $\frac{P_t}{B_t}=\alpha_{10}+\alpha_{11}\frac{E_t}{B_t}+u_{1t}$

	1971	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*
Observations	369	384	388	382	374	372	390	405	405
Jan	.380	.485	.347	.159	.264	.355	.329	.336	.230
Feb	.379	.477	.337	.163	.260	.361	.310	.348	.238
Mar	.377	.484	.335	.173	.273	.371	.315	.379	.247
Apr	.389	.486	.344	.181	.282	.377	.338	.400	.273
May	.390	.483	.332	.181	.297	.391	.363	.403	.281
Jun	.389	.489	.326	.187	.311	.412	.370	.413	.303
Jul	.407	.489	.337	.214	.330	.412	.378	.420	.310
Aug	.428	.484	.339	.222	.341	.423	.384	.433	.324
Sep	.434	.479	.352	.244	.357	.428	.386	.420	.318
Oct	.442	.471	.355	.251	.344	.424	.392	.433	.323
Nov	.439	.485	.326	.255	.333	.442	.405	.434	.286
Dec	.438	.472	.321	.263	.348	.458	.405	.443	.275
Jan	.420	.464	.355	.268	.350	.477	.383	.444	.282
Feb	.412	.443	.354	.262	.352	.443	.395	.435	.268
Mar	.409	.438	.366	.261	.347	.438	.397	.428	.309

in addition provides some support for the use of the level of explanatory power of a valuation model as a rough measure of the information content of the explanatory variables used.

The validity of the above results can be evaluated by determining if a corresponding phenomenon occurs in the pre-report period: Do the company's future financial statement data become increasingly

TABLE 8

TRENDS IN EXPLANATORY POWER: 15-MONTH PRE-REPORT PERIOD JANUARY TO MARCH: MODEL 2

UNADJUSTED R^2 FROM MODEL $\frac{P_t}{B_t}=\alpha_{20}+\alpha_{21}\frac{E_t}{B_t}+\alpha_{22}\beta_t+\alpha_{23}\frac{\Delta B_t\pi_t}{B_t}+\alpha_{24}\frac{\Delta B_t}{B_t}+u_{2t}$

	1971	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*
Observations	369	384	388	382	374	372	390	405	405
Jan	.462	.575	.511	.374	.399	.415	.435	.405	.289
Feb	.464	.573	.496	.370	.392	.431	.416	.417	.305
Mar	.465	.580	.497	.381	.417	.429	.419	.451	.302
Apr	.473	.582	.500	.383	.440	.442	.442	.482	.333
May	.474	.579	.495	.380	.455	.462	.463	.484	.339
Jun	.473	.584	.483	.382	.464	.467	.469	.495	.360
Jul	.491	.588	.490	.390	.477	.460	.463	.493	.364
Aug	.508	.587	.493	.394	.484	.464	.459	.511	.376
Sep	.515	.581	.502	.408	.499	.474	.459	.494	.374
Oct	.521	.575	.505	.408	.475	.475	.468	.501	.386
Nov	.514	.585	.471	.420	.464	.501	.480	.501	.342
Dec	.517	.575	.462	.417	.487	.515	.479	.507	.322
Jan	.502	.572	.492	.444	.490	.537	.457	.504	.332
Feb	.496	.553	.483	.439	.500	.522	.468	.494	.317
Mar	.492	.548	.494	.450	.487	.510	.469	.490	.366

relevant for the explanation of prices as the financial statement date approaches? This question was examined next.

Intra-Year Trends: Pre-Report Period

This phase of the study was based on financial statements for the years 1972 to 1980—a total of nine years. The estimated coefficients of determination are shown in Tables 7 and 8. Regressions of the transformed coefficients of determination for the period extending from 12 months before the balance sheet date to three months afterwards were run on time in months (January = month one, balance sheet date = month 12, March after balance sheet date = month 15). In this case a positive coefficient on time would be expected. The coefficients of determination were transformed in a manner similar to the R^2 for the post-report period.

The labeling of the columns in Tables 7 and 8 is the same as in Tables 3 and 4. For example, the 1971 column is based on price data for January 1971 to March 1972. The nine R^2 series (1971 to 1979) are pre-report series for the financial statements for the 1971 to 1979 calendar years.

Regressions were run of the transformed coefficients of determination on time. The estimation results are reported in Table 9. The results for Model 1 are fairly strong—eight of the nine coefficients are positive, and six of these eight are significant at the one percent level. The negative coefficient (for 1972) is significant at the one percent level. The results for Model 2 are fairly similar. Five of the eight positive coefficients are significant at the one percent level. The negative coefficient—for 1973—is not significant at the five percent level.

Next, we compare the trends in explanatory power for price series over identical periods in the pre- and post-report periods. Note that the R^2 series for, say, 1971 are for the same period in Tables 3, 4, 7, and 8, although the samples differ slightly

TABLE 9

ESTIMATION OF TRENDS IN EXPLANATORY POWER OF VALUATION MODELS: JANUARY TO MARCH OF SUCCEEDING YEAR

	Pre-Report Period	
Year	*Coefficient of Time**	*t-Statistic*
Model 1		
1971	.010	3.89
1972	−.007	−3.93
1973	.003	1.43
1974	.025	13.66
1975	.018	7.74
1976	.020	9.11
1977	.017	6.83
1978	.017	6.22
1979	.009	2.19
Model 2		
1971	.026	4.40
1972	.000	.01
1973	−.010	−1.86
1974	.030	6.87
1975	.040	3.66
1976	.052	8.75
1977	.018	2.20
1978	.040	4.09
1979	.023	1.74
	$t(10\%)=1.77$ $t(5\%)=2.16$ $t(1\%)=3.01$	

* This is the estimate of γ_1 in the regression $z_t=\gamma_0+\gamma_1 t+\epsilon_t$, where z=transformed R^2 from Tables 7 and 8, and t=time in months.

TABLE 10

SPEARMAN CORRELATION COEFFICIENTS (ϱ) BETWEEN R^2 IN PRE-REPORT PERIOD AND MONTH INDEX

	Model 1		*Model 2*	
	ϱ	*Significance Level**	ϱ	*Significance Level**
1971	.74	.002	.75	.001
1972	(.64)	.01	(.35)	.19
1973	.36	.19	(.41)	.12
1974	.97	<.001	.97	<.001
1975	.89	<.001	.87	<.001
1976	.95	<.001	.95	<.001
1977	.89	<.001	.69	.005
1978	.90	<.001	.67	.006
1979	.45	.09	.39	.15

* Test of hypothesis $\varrho=0$ against alternative $\varrho\neq 0$.

TABLE 11

SPEARMAN CORRELATION COEFFICIENTS (ϱ) BETWEEN PRE-REPORT R^2 MINUS POST-REPORT R^2 VS MONTH INDEX

	Model 1		Model 2	
	ϱ	Significance Level*	ϱ	Significance Level*
1971	.90	<.001	.97	<.001
1972	.58	.03	.45	.10
1973	1.00	<.001	.99	<.001
1974	.89	<.001	.92	<.001
1975	1.00	<.001	.83	<.001
1976	.70	<.004	.98	<.001
1977	1.00	<.001	.99	<.001
1978	.96	<.001	.96	<.001
1979	.94	<.001	.99	<.001

* Test of hypothesis $\varrho=0$ against alternative $\varrho\neq0$.

from the pre- to post-report periods. The comparison indicates a dramatic reversal of estimated trends from the pre-report to post-report periods, and provides additional support for the hypotheses.

Results of tests based on the rank correlation between R^2 and the month index are shown in Table 10. As with the post-report data, these results are similar to the regression results for the corresponding periods.

In view of the trend reversals and of the overall levels of statistical significance for the drift coefficients, it appears reasonable to conclude that the results support the proposed hypothesis; financial statement data appear to become increasingly relevant for the explanation of security prices as the financial statement date approaches and appear to become less and less relevant thereafter.[7]

A Comparison of the Pre- and Post-Report Periods

The above results indicate pervasive trends in model explanatory power in both pre-report and post-report periods. However, it is likely that the behavior of valuation models is affected by factors other than the age of the accounting data.

As mentioned above, each series of prices can be viewed as a pre-report or a post-report series. For example, prices for the period January 1971 to March 1972 form the pre-report series for December 1971 accounting data and the post-report series for December 1970 data. Any influences on model behavior unrelated to the aging of data should be present in both series of explanatory power. Plots of the pre- and post-report series strongly suggest the presence of such influences. There appear to be temporary changes in explanatory power

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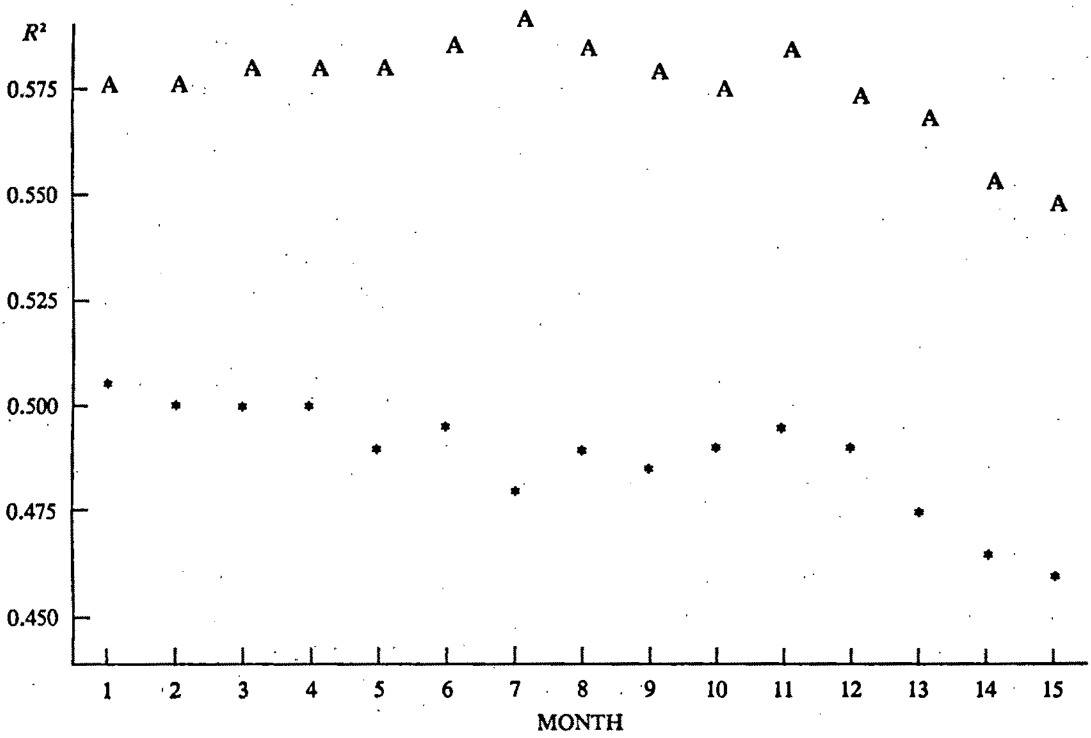
[7] Among the replications performed was one in which all companies with capital changes (stock splits or stock dividends) in the periods from which prices were drawn were eliminated from the sample. The results were in essence unchanged from these reported in this paper. Another replication was based on models one and two estimated without intercepts—a specification that omits the book value term in the undeflated valuation equation, as in Litzenberger and Rao [1971]. The pre-report period for both models had two more years (than the models with an intercept) in which there were no discernible trends, but the overall results were quite similar to those reported in this paper. In general, the results appear to be fairly robust to specification changes.

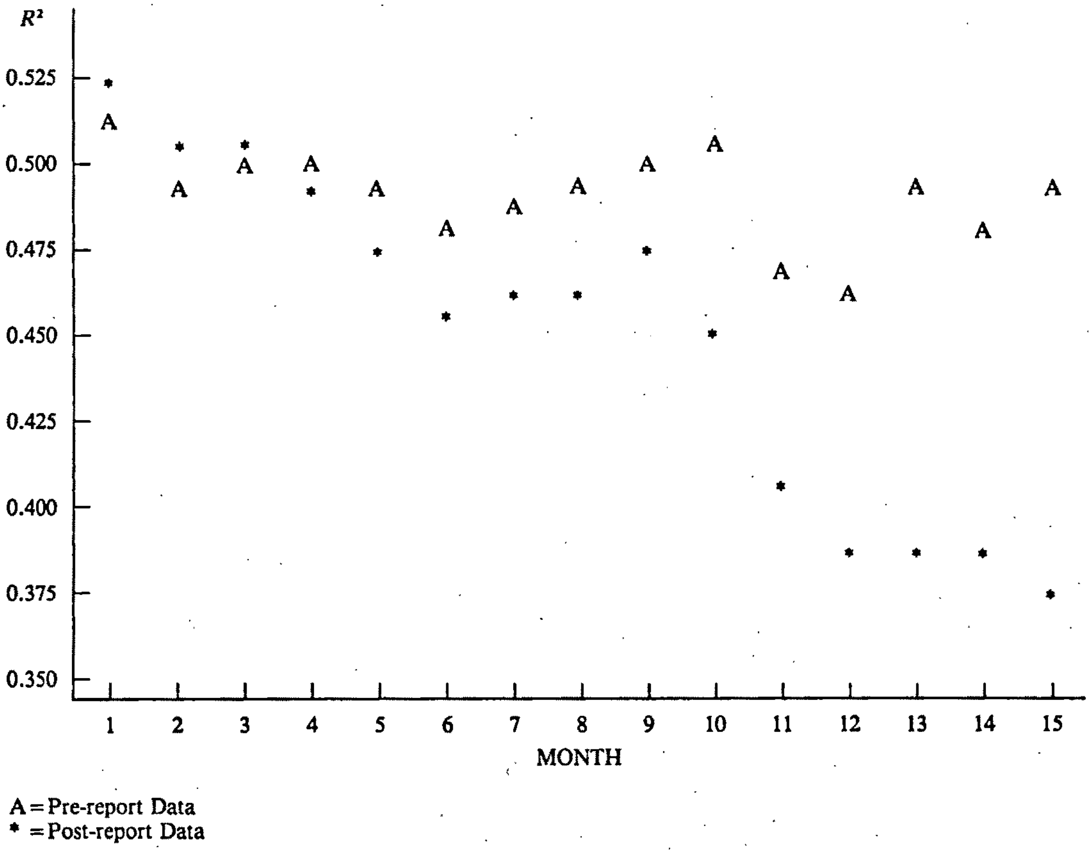
FIGURE 1
PLOT OF R-SQUARE AGAINST TIME IN MONTHS
MODEL 2, 1972



A = Pre-report Data
* = Post-report Data

superimposed on the aging trends in both pre- and post-report series. This phenomenon is illustrated in Figures 1 to 4 using R^2 plots for Model 2 in the years 1972, 1973, 1975, and 1976. These years were chosen because their trend results were not as conclusive as the others' in either the pre-report or post-report analysis. Other years' plots are comparable. The graphs seem to indicate that the anomalous results obtained for 1972 (pre-report), 1975, and 1976 (post-report) may be due in part to non-aging influences. Furthermore, it appears that in spite of the rough similarity of each pair of R^2 series, there is a tendency for R^2 to increase in the pre-report series and to decline in the post-report series. To highlight this *relative* movement between the intra-year series, the difference in R^2 was examined. This was defined as pre-report R^2 minus post-report R^2 for each month. The series of differences should show a positive trend if indeed temporary influences are superimposed on the aging trend. The relative trend phenomenon is addressed directly by examining the rank correlation between the series of R^2 differences and the index for months in each 15-month period. The results, shown in Table 11, indicate a strong tendency for the pre-report and post-report series to

FIGURE 2
PLOT OF R-SQUARE AGAINST TIME IN MONTHS
MODEL 2, 1973



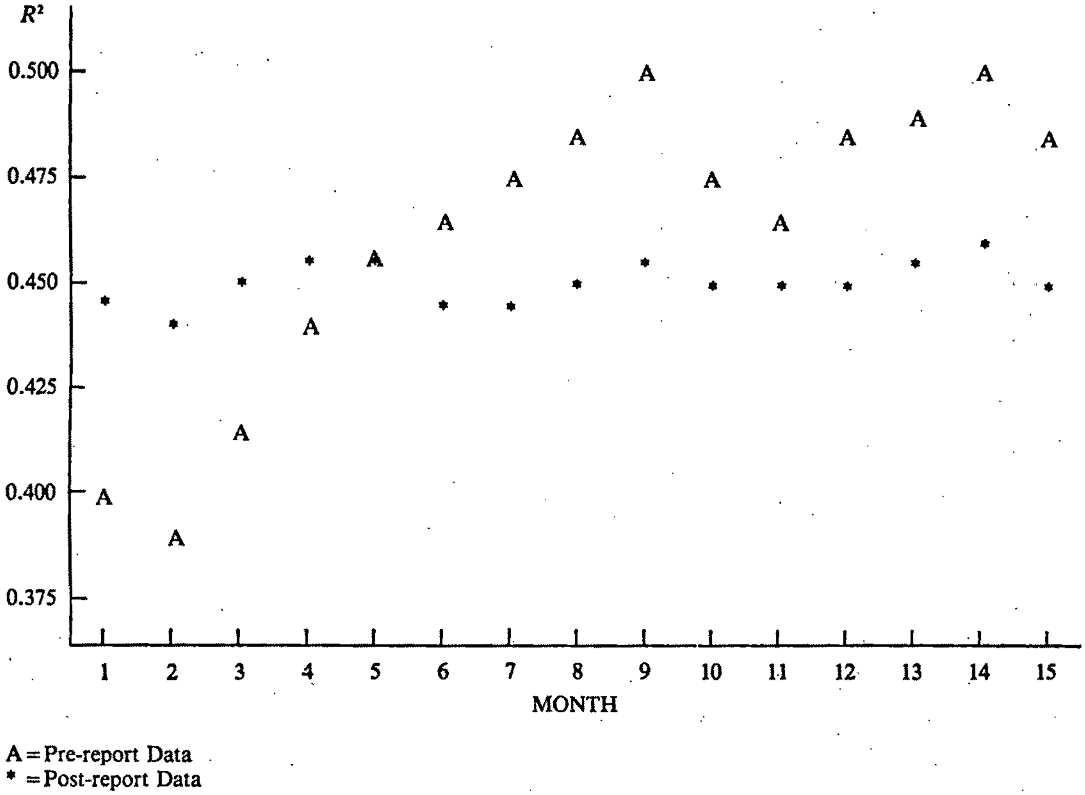
move in opposite directions in every period.

The degree of rank correlation is almost uniformly stronger than for the individual series, suggesting that confounding influences are to some extent responsible for (the occasional) anomalous results reported in Tables 6 and 10. It therefore appears that the observed changes in model explanatory power do not occur in isolation but interact with other influences on explanatory power. Some possible sources of temporary changes in model explanatory power were discussed in the section on "Other Measurement Issues."

SUMMARY AND CONCLUSION

This research examined the existence of trends in the explanatory power of a given set of accounting variables for prices at different times. Ball and Brown [1968] established the existence of association between unexpected changes in earnings and price changes. One would expect that this phenomenon would be manifested in the price domain through the association

FIGURE 3
PLOT OF R-SQUARE AGAINST TIME IN MONTHS
MODEL 2, 1975



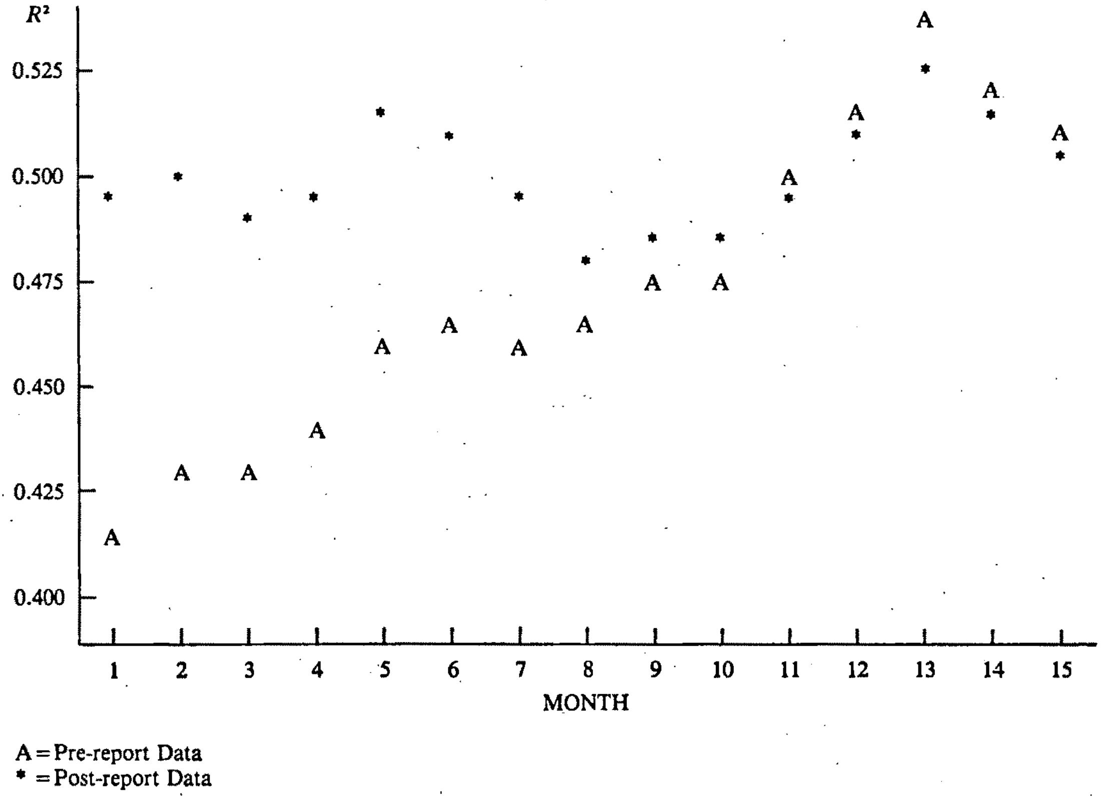
between prices and accounting data at different times.

The results indicated that given sets of accounting data generally became more relevant for the explanation of security prices as the reporting date approached. Furthermore, an examination of the trend in explanatory power after the reporting date showed a decline in explanatory power as the accounting data became increasingly outdated.

This study provides a link to the studies of the association between unexpected earnings and price changes (returns) by documenting a corresponding phenomenon for price and accounting variable levels also. In addition, the results provide some assurance that the valuation models examined capture important elements of reality. This provides additional confidence in the basic appropriateness of the valuation models. The tenor of the results remained unchanged for different model specifications and measures of trends in explanatory power, suggesting a good level of robustness.

An issue for future research concerns the extent to which the observed trends are due solely to differences in the level of income from one year to the next rather than to differences in other variables. This would involve an examination of the

FIGURE 4
PLOT OF R-SQUARE AGAINST TIME IN MONTHS
MODEL 2, 1976



relevance of non-income information for security pricing and changes in the degree of relevance over time. Another interesting issue is the relationship between the degree of earnings change and the rate of change of model explanatory power.

By extending the method described to non-earnings data, the researcher could examine the importance in security valuation of accounting variables seldom studied in information usefulness research. Research on these issues is in progress.

APPENDIX

TABLE A1

SUMMARY OF REGRESSION MODEL ESTIMATES: MARCH REGRESSIONS
(ABSOLUTE VALUES OF t-STATISTICS IN PARENTHESES)
BASED ON PRICES AFTER BALANCE SHEET DATE

MODEL 1: $\frac{P_t}{B_t} = \alpha_{10} + \alpha_{11}\frac{E_t}{B_t} + u_{1t}$

	R^2	α_{10}	α_{11}
1971	.319	.949 (8.12)	13.230 (13.15)
1972	.395	.355 (2.45)	20.580 (15.97)
1973	.419	−.788 (4.46)	25.478 (17.05)
1974	.381	−.646 (4.67)	17.131 (16.24)
1975	.268	.176 (1.82)	8.232 (12.16)
1976	.348	.459 (5.97)	8.481 (14.51)
1977	.437	.066 (.90)	9.319 (17.59)
1978	.377	.241 (3.87)	6.899 (15.78)
1979	.384	.211 (3.16)	7.011 (16.22)
1980	.304	.252 (3.52)	5.537 (13.50)

APPENDIX

TABLE A2
SUMMARY OF REGRESSION MODEL ESTIMATES: MARCH ESTIMATION
(ABSOLUTE VALUES OF t-STATISTICS IN PARENTHESES)
BASED ON PRICES AFTER BALANCE SHEET DATE

MODEL 2: $\frac{P_t}{B_t}=\alpha_{20}+\alpha_{21}\frac{E_t}{B_t}+\alpha_{22}\beta_t+\alpha_{23}\frac{\Delta B_t\pi_t}{B_t}+\alpha_{24}\frac{\Delta B_t}{B_t}+u_{2t}$

Year	R^2	α_{20}	α_{21}	α_{22}	α_{23}	α_{24}
1971	.459	1.419	7.855	−.241	64.511	−6.320
		(5.37)	(7.07)	(1.33)	(8.62)	(5.42)
1972	.499	.716	13.016	−.097	57.067	−3.625
		(2.37)	(8.58)	(.51)	(7.12)	(3.41)
1973	.504	.714	16.267	−.692	65.462	−5.347
		(2.29)	(9.11)	(3.89)	(6.32)	(3.80)
1974	.553	.926	10.113	−.711	46.720	−4.400
		(3.96)	(8.43)	(6.21)	(6.17)	(3.72)
1975	.449	.414	3.820	−.021	62.112	−6.463
		(2.37)	(5.38)	(.17)	(9.22)	(5.92)
1976	.492	.377	4.390	.186	42.269	−3.637
		(2.56)	(6.56)	(1.84)	(7.40)	(3.81)
1977	.515	.420	6.684	−.123	21.326	−2.248
		(3.64)	(10.93)	(1.61)	(6.27)	(3.49)
1978	.460	.410	5.309	.006	28.639	−4.144
		(3.99)	(10.82)	(.09)	(7.58)	(5.99)
1979	.453	.283	5.322	.099	29.774	−4.339
		(2.63)	(10.63)	(1.35)	(6.78)	(5.40)
1980	.366	.816	4.011	−.371	10.795	−.828
		(6.19)	(8.32)	(4.80)	(2.88)	(1.08)

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Data Models Research in Accounting: An Evaluation of Wholesale Distribution Software

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ABSTRACT: The data definitions in the order entry modules of 12 wholesale distribution software packages were studied to determine whether (a) their high-level semantics complied with McCarthy's [1982] REA accounting model; (b) their detailed semantics manifested a common underlying accounting model; (c) their semantics could be modeled adequately using the entity-relationship modeling technique; and (d) their record structures followed the prescriptions of normalization theory. The results indicate that the major elements of the REA model are incorporated in the packages. However, they differ semantically in several important areas that could not be detected by the REA model because it is too general. Use of the entity-relationship modeling technique to represent the semantics of the packages was relatively straightforward. In terms of record structures, the packages conform with the prescriptions of normalization theory to a large extent, although there are still several violations of normal form.

IN the discipline of computer science, research on database management systems has been concerned with developing better ways of representing, storing, and processing data by machines. In general, it has had four goals: increased sharability of data, increased availability of data, improved evolvability of data, and increased data integrity [Everest, 1974]. These goals have motivated several accounting researchers to assimilate the results of this research into the accounting discipline (e.g., Colantoni, Manes, and Whinston [1971]; Lieberman and Whinston [1975]; Haseman and Whinston [1976]; Everest and Weber [1977]; McCarthy [1979, 1981, 1982]; and Weber [1982]). Supposedly, existing accounting systems are too limited in their dimensions; they exclude important data (e.g., reliability data), use constrained classification schemes, store information that is too highly aggregated, and fail to achieve an acceptable level of integration with other functional

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areas of the enterprise [McCarthy, 1982]. By applying the results of database management systems research to the accounting domain, these deficiencies might be overcome.

To date the accounting researchers have tended to study only the data modeling aspects of database management systems research, that is, the ways in which data can be organized so they represent the real-world domain of interest as closely as possible yet they are still amendable to computer processing [Tsichritzis and Lochovsky, 1982]. Initially, the research investigated whether traditional accounting data could be represented via the data modeling techniques developed by database management systems researchers to facilitate sharability, availability, evolvability, and data integrity. These efforts provided a test of how well accountants perceived the real world of interest and a test of the veracity of the data modeling techniques often formulated and applied in artificial and constrained domains of discourse. Everest and Weber [1977] found, for example, that accountants often dealt with "artifacts" like charts of accounts that could not be modeled easily by the relational data model. Subsequently, the research turned to formulating normative data models to show what data should be captured and how they should be structured to overcome the perceived deficiencies in traditional accounting systems (e.g., McCarthy [1982]).

Independently of the accounting and database management system research, however, organizations have gone ahead and written accounting applications software. These implementations potentially provide a rich source of data against which to test the models proposed by the researchers. If the alleged research problems exist and have practical significance, software practitioners may have independently derived solutions. If their solutions map reasonably well into those advocated by the researchers, the data provide support for the research models. Alternatively, different practical solutions may have been found, in which case the adequacy of the research solutions must be evaluated by other means. Or practitioners may have identified but not resolved the problems, in which case the data models can be used to generate predictions concerning deficiencies that users will encounter in the software. Finally, the problems may not exist in the real world of practitioners or they may be perceived as having no practical significance, in which case they are research figments.

This paper reports a study of the order entry modules in 12 wholesale distribution software packages. The study had a fourfold objective. First, it examined whether, at a general level, the semantics incorporated in the software conformed with the normative prescriptions of accounting researchers working in the data models area. Second, it examined whether, at a detailed level, the packages were designed on the basis of a common underlying accounting semantic model. Third, it examined the strengths and limitations of a data modeling technique advocated by accounting researchers. Fourth, it examined the adequacy of the record designs incorporated in the packages.

The paper proceeds as follows. The first section describes the theory and concepts to be evaluated in the research. Subsequently, the research method used to obtain the data structure definitions of the software investigated is presented. The methods used to analyze the software and the results obtained are then given. Finally, the paper discusses some implications of the results obtained, several future research directions, and conclusions that can be drawn from the research.

THE NORMATIVE BASE

The normative guidelines of database management systems research range over a broad spectrum of issues: logical database design, physical database design, security, administration, etc. (see, e.g., Date [1983]). This research focuses on the theory supporting logical design, specifically the prescriptions on data modeling. This restriction is purposeful: data modeling will be the purview of accounting information system designers while physical design will be the primary responsibility of others.

Given this focus, two activities must be undertaken: *infological* modeling and *datalogical* modeling [Tsichritzis and Lochovsky, 1982]. Infological modeling maps the real world into constructs that describe the domain of discourse in a natural way—one independent of computers. Datalogical modeling maps the infological constructs into a set of computer-oriented logical constructs that can then be mapped into a physical design. Existing accounting software can be evaluated in terms of how well each of these activities has been performed. Conversely, the normative models can be evaluated in terms of how well they "fit" accounting phenomena.

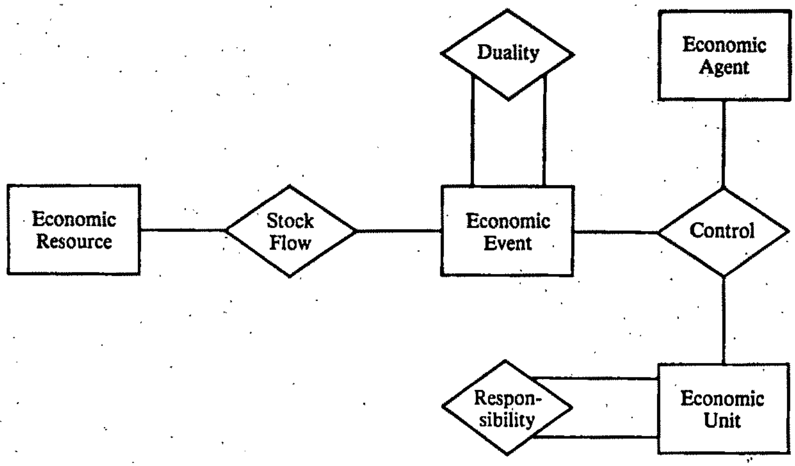
INFOLOGICAL CONSIDERATIONS

Infological modeling requires that (a) the phenomena in the real world of interest be identified, and (b) a data modeling technique be chosen to represent these phenomena so they can be understood, communicated, and manipulated. As noted previously, some accounting research has criticized both the choice of phenomena and the ways in which phenomena have been represented in traditional accounting systems. This research has culminated in an alternative infological model proposed by McCarthy [1982] called the REA accounting model (see Figure 1a). This model shows economic resources, economic events, economic units, economic agents, stock flows, duality relationships, control relationships, and responsibility relationships rather than elements based in double-entry bookkeeping. It seeks to provide a *generalized* framework for viewing the world of accounting phenomena and identifying the appropriate elements of interest that will facilitate establishing a shared data environment. In other words, it proposes high-level semantics that should exist in an accounting information system, within which the detailed semantics can then be worked out.

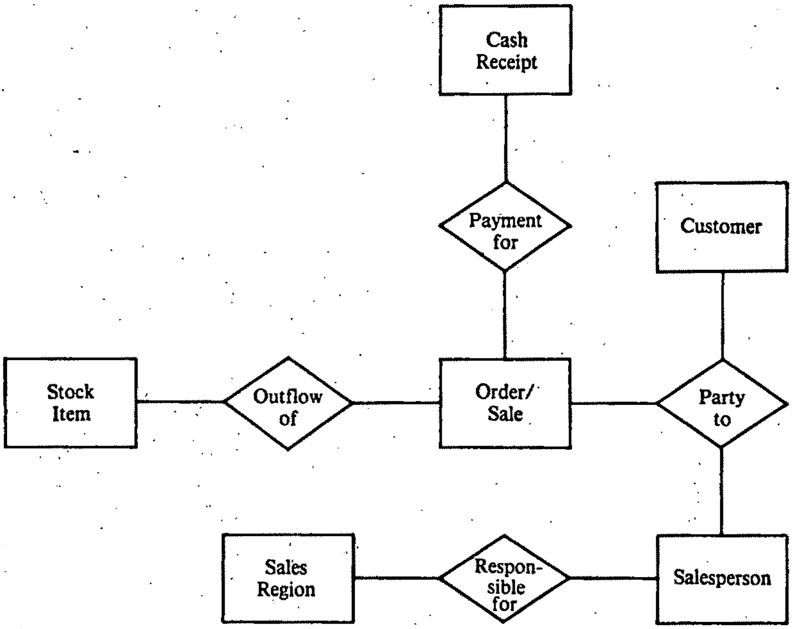
McCarthy's model provides the first basis for evaluating the infological models implemented in existing accounting software. Since his model purportedly overcomes deficiencies in traditional systems, designers of established accounting software should be aware of these deficiencies if they are important. Moreover, it is likely they would have attempted to resolve them somehow. If the phenomena modeled in the software are the same as those incorporated in McCarthy's model, his arguments are supported. If this is not the case, either (a) the problems do not exist or they are insignificant, (b) unresolved deficiencies still exist in the software, or (c) alternative solutions to the problems have been found. In any event, the infological models implemented in existing software provide important evidence on the adequacy of McCarthy's REA model in two respects. First, in terms of high-level semantics, they indicate whether McCarthy's model is a good description of practice. Second, if the high-level semantics do, in fact, conform to Mc-

FIGURE 1
THE REA ACCOUNTING MODEL

(a) The General Model



(b) Order Entry Instantiation



Carthy's model, they indicate whether use of the high-level model has elicited common low-level semantics.

The choice of a data modeling technique to support infological modeling is the next issue to resolve. Research on data modeling techniques has pursued two somewhat conflicting objectives. It has sought ways to structure data so that they capture the semantics in the domain of interest, and it has sought efficient ways to manipulate these data. These objectives often conflict because a modeling technique that imposes more structure on the way data are represented makes it easier to define operations on the data, but it forces the data into homogeneous categories that distort or destroy some of their semantics. Currently, over 30 data modeling techniques have been proposed in the database management systems research literature (see Kerschberg, Klug, and Tsichritzis [1976]). Some have been developed primarily to support infological modeling; others primarily to support datalogical modeling. Their proponents actively debate their relative strengths and limitations (e.g., Olle et al. [1982]). This debate is poor consolation for the accounting practitioner who must choose a technique to design or evaluate accounting infological models or to the accounting researcher who seeks to better understand the semantics that underlie accounting software. In this light, empirical evidence is needed on the strengths and limitations of the various data modeling techniques that can be used for infological modeling purposes.

The data modeling technique investigated in this research is Chen's [1976] entity-relationship model (ERM). It has been chosen for two reasons. First, McCarthy has used the ERM technique to formulate his REA accounting model. Thus, by eliciting the semantics underlying existing accounting software using the ERM technique, a comparison of these semantics with those in the REA accounting model is facilitated. Second, the ERM technique appears to be useful as an infological modeling technique in an accounting context (see, e.g., Weber [1982]). As McCarthy [1979] points out, it is semantically expressive and able to communicate critical constructs to database users who are unskilled in database management systems technology. Nonetheless, by applying the ERM technique to real-world accounting software, its adequacy as a modeling tool can be tested. If it proves to be inadequate, other data modeling techniques must be evaluated.

Once the data modeling technique to be used for infological modeling purposes has been chosen, three objectives can be accomplished: first, the general semantic models incorporated in the different software packages can be elicited and evaluated against the REA model; second, if at a detailed level a common underlying accounting semantic model has evolved, it can be identified and evaluated; and third, difficulties inherent in applying the data modeling technique can be identified and its capabilities and limitations examined.

DATALOGICAL CONSIDERATIONS

Infological models are mapped into datalogical models which, in turn, are mapped into physical storage structure models. Datalogical modeling appears to have emerged as an intermediate step because the jump between infological modeling and physical storage structure modeling seems to be cognitively too difficult for many designers to make [Langefors, 1980]. Whereas infological models exist in the minds of designers, datalogical models are manifested in the software used to implement a design.

The primary decision to be made in datalogical modeling is the choice of the data modeling technique to be used. Again, matters are not clear-cut. The relative strengths and limitations of the various datalogical modeling techniques are still being debated [Tsichritzis and Lochovsky, 1982, pp. 245–250]. Thus, the choice of a particular data modeling technique either reflects pragmatic considerations—in the datalogical realm the database management system to be used dictates the data modeling technique to be used—or it reflects the preferences of the database designer.

When evaluating the datalogical models implemented in existing software, the difficulties that arise from having to choose a *specific* data modeling technique for evaluation purposes can be avoided to some extent, at least initially. In spite of their many differences, all the major datalogical modeling techniques used in the design of existing accounting software have a common characteristic: they all use a record-based structure. Furthermore, much of the datalogical modeling research that has occurred over the last 15 years has been concerned with developing prescriptive guidelines for record design. In this light, these *common* prescriptive guidelines can be evaluated in any initial empirical research before pursuing the more difficult issue of how *differences* among the datalogical models affect design quality.

Accordingly, the datalogical modeling technique investigated in this research is normal form. While normal form was developed initially by relational data modeling theorists, Kent [1983] points out that it applies to *any* data model that uses a record-based design—for example, the flat file data model, the hierarchical data model, or the network data model. It prescribes how records should be designed to prevent update anomalies and data inconsistencies from occurring.

If the record structures in existing accounting software comply with normal form, therefore, *prima facie* support exists for the recognition by software designers of the update anomalies and data inconsistencies that can arise when constraints are not placed upon record designs. If the record structures do *not* comply with normal form, however, further research must be undertaken. On the one hand, lack of compliance may indeed mean that software designers have not recognized the benefits of normalization and, as a consequence, update anomalies and data inconsistencies are problematic aspects of using the software. On the other hand, it has recently been realized that purposeful deviations from normal form might be undertaken for two reasons. First, Kent [1983, p. 120] points out that normalization guidelines "are biased toward the assumption that all nonkey fields will be updated infrequently. They tend to penalize retrieval, since data which may have been retrievable from one record in any unnormalized design may have to be retrieved from several records in the normalized form." Second, software designers may have chosen to enforce the constraints implied by normalization in other ways; for example, the constraints might be embedded in the procedures that operate on the record structures rather than being expressed as explicit properties of the record structures themselves [Tsichritzis and Lochovsky, 1982, pp. 38–41].

From an accounting and auditing perspective, however, a finding of noncompliance with normalization is significant. Traditionally, accountants and auditors have always stressed the importance of maintaining the integrity of accounting data. Deviations from normalization that threaten data integrity are a concern and need to be justified.

SURVEY METHOD

To test the REA accounting model and ER and normal form modeling techniques, a survey of 160 vendors of wholesale distribution software was conducted. The survey was restricted to wholesale distribution software because industry-specific issues may confound the analysis. Furthermore, insofar as wholesale distribution software was among the first set of generalized packages developed, vendors have accumulated substantial experience and the data models should be relatively stable.

The names and addresses of vendors were obtained from Data Sources [1982], a software directory. Letters were sent to each vendor describing the nature of the research and requesting that they provide the file, record, and field descriptions for their package. The letter guaranteed the confidentiality of the detailed information they provided and promised them a copy of the research report. It asked them to respond only if their packages supported, as a minimum, order entry with invoicing, open item accounts receivable, open item accounts payable, inventory control, payroll, and general ledger. A pre-paid envelope and package profile questionnaire were also provided. The package profile questionnaire solicited information about the machines on which the package would run, the number installed, the date the package was first installed, the programming language in which it was written, and the pricing details. These data were sought to determine whether a package was at a stable stage in its development and whether differences in the data models might exist because of pricing or system configural differences.

Given the proprietary nature of the data needed to fulfill the research objectives, a low response rate to the survey was expected. Accordingly, all known vendors of wholesale distribution software were contacted. Of the 160 vendors to whom letters were sent, 13 provided the data needed (although two vendors supplied data on the same package), four provided incomplete data, nine indicated they were unwilling to provide the data requested, and three were returned as address unknown. Thus, as expected, the response rate (eight percent) was low. Nevertheless, the package profile questionnaires indicated that the responses obtained were for major packages, reflected either in the name of the vendor, the number of sales, or the price of the package as an indicator of the resources devoted to its development. By agreement with the vendors, these data cannot be shown, and in four cases they were incomplete or not provided because of their proprietary nature. The eight packages for which data were provided, however, account in total for users in over 2,700 organizations. Thus, even though the response rate is low, clearly the results obtained apply to a substantial number of users of wholesale distribution software.

DATA ANALYSIS

An initial attempt was made to analyze all modules within a package. Because of the large volume of data—there were many records and some records contained over 50 fields—the analyses proved to be exceedingly awkward and unwieldy. Consequently, only the order entry module was chosen for further investigation. This is usually the most complex module in the packages; thus, it should be sufficiently rich semantically to test the REA model and the ER and normal form modeling techniques.

The data analysis for each package proceeded in two steps. First, an entity-relationship diagram (ERD) was constructed to represent the infological model implicit in file and record structures used in the package. The ERD provided the basis for evaluating whether the infological model underlying the package conformed to McCarthy's REA model, whether each package manifested common semantics in the accounting domain, and whether the ERM was an adequate infological modeling tool. Second, the record structures used in each package were evaluated to see whether they had been normalized as a basis for determining the likelihood of update anomalies and data inconsistencies occurring when the package was used.

Procedures for Infological Analysis

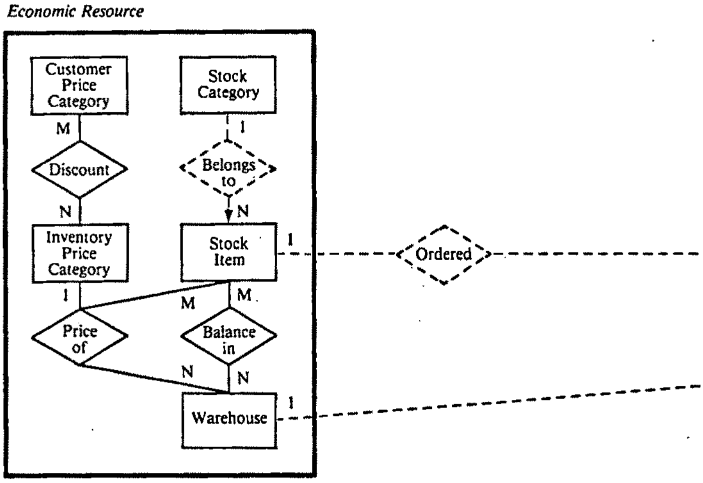
To construct the ERD for each package, four steps were undertaken. First, the file and record descriptions for each package were examined, and any files used for internal purposes only were eliminated from further analysis. For example, some files contained format records or pointer records that were used by the package to facilitate its operations rather than to model the object system or real world of interest. Second, all files used to store temporary work values were eliminated from further analysis. These work files are transparent to the user and again are not needed to model the domain of interest. Third, files containing aggregated or summary data were eliminated from further analysis. These files contain derived data that can be obtained via the "conclusion materialization" procedures described by McCarthy [1982]. Moreover, they provide generic information about a *class* of objects rather than the specific object itself.

The final step was to elicit the entities and relationships represented in the records that remained. The key fields in each record first were identified. In all cases they were designated as such in the data definitions supplied but, in any event, they could be identified easily since their values were needed to identify a particular instance of the record. Next, if the record contained only one key field, it was designated as an entity type since it stored facts about a single object. If the record contained more than one key field, however, either it represented a relationship type or it represented *both* an entity type and a relationship type. The former case could be identified when nonkey fields were functionally dependent on the whole key and not some subset of the key (see, further, Chen [1976] and Kent [1983]). The latter case could be identified when some of the nonkey fields were functionally dependent on a subset of the key. The fields in the record were then separated according to that part of the key on which they were functionally dependent. If they related to a single key field, they described an entity type. If they related to two or more key fields, they described a relationship type.

To illustrate these procedures, assume that a record contains only the following fields (key field is in italics): *stock item number*, stock item description, quantity-on-hand. This record clearly represents an entity type since it stores facts about a single object. Furthermore, note that all nonkey fields depend upon the value of the key field (stock item number). Alternatively, assume that a record contains the following fields: *stock item number, warehouse number,* quantity-on-hand. In this case the record represents a relationship type since the nonkey field (quantity-on-hand) depends on the two key fields (stock item number and warehouse number). Finally, assume that a record contains the following fields: *stock item number, warehouse number,* stock description, quantity-on-hand. In this case, the value of stock description depends only on stock item number, but the value of quantity-on-hand depends on the value of both the stock item number and the warehouse

FIGURE 2

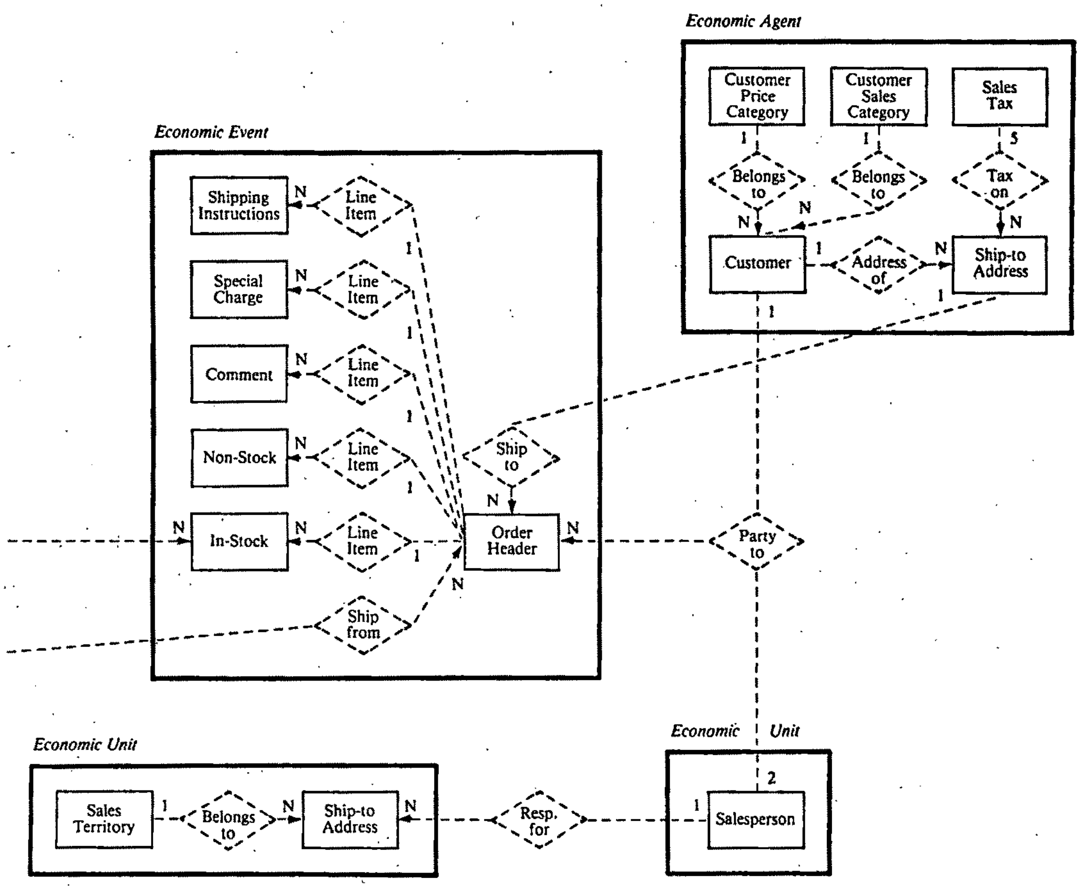
ERD FOR PACKAGE 1



number. Thus, the fields are separated into two subsets: stock item number and stock description to describe an entity type; and stock item number, warehouse number, and quantity-on-hand to describe a relationship type. In this case both the entity type and relationship type were shown in the ERD, even though they were represented in the package as a single record.

Once the entity and relationship types had been identified, with three exceptions ERDs were drawn in the normal way. First, to simplify the ERDs and because they had no relevance to the data analysis, weak entity and weak relationship types were not shown diagrammatically, even though some were present (see Chen [1976]). Second, if a relationship type was implied because it was embedded in a single record with another relation, it was drawn with a broken line. Furthermore, an arrow was placed on the arc that linked the relationship type to the entity type with which it had been embedded in a single record. Finally, in some cases entities were also implied, and these were drawn with a broken line. For example, a field salesperson number may have appeared in several records, and it may have formed the basis for sorting records and

FIGURE 2—(*Continued*)



preparing reports. Nevertheless, no separate salesperson record might have existed in the package. Because of its relevance to the REA model, however, it was designated as an implied entity type and shown in the ERD accordingly.

Procedures for Datalogical Analysis

The procedures for datalogical analysis involved examining each record to see whether it had been normalized. Each field in each record was tested to see whether the edicts of normalization had been violated. Kent [1983] provides a tutorial on normalization theory and the five normal forms that a record might take. Briefly, a record is in first normal form (1NF) if it excludes variable repeating fields and groups. It is in second normal form (2NF) if all nonkey fields are fully functionally dependent on the whole key and nothing but the key. It is in third normal form (3NF) if all nonkey fields are not functionally dependent on any other nonkey field. It is in fourth normal form (4NF) if it does not contain two independent multivalued facts about an entity. Finally, it is in fifth normal form (5NF) if it cannot be reconstructed from smaller pieces of information that can be maintained in separate records with less redundancy.

RESULTS

While overall summary results are presented here, in the interests of brevity only the detailed results for three packages are shown. (A report on all packages can be obtained from the author.) Nevertheless, the results presented are representative of the range of complexity present in the packages: Package 1 is a moderately complex package; Package 2 is a simple package; and Package 3 is a complex package. The results for the other packages simply provide more evidence to confirm the results reported here, and they also support the generality of those results, even though the overall sample size is small.

Infological Results

Recall that the infological analysis examines (a) whether the infological models embedded in the software conform to the REA model; (b) as a related issue, whether the models manifest common underlying semantics; and (c) whether the ERM is an adequate infological modeling tool in the accounting domain. To provide a context for the results, Figure 1b shows an order entry module instantiation of the REA model. Figures 2–4 present the ERDs for each of the three packages to be examined in detail. Note that the duality relationship has not been shown in any of these figures since the cash receipts associated with an order are handled in the accounts receivable module, which has not been analyzed. In addition, to facilitate a comparison between the packages and the REA model, the detailed entities and relationships have been grouped wherever possible according to the more general entities and relationships that comprise the REA model (see, also, Chen [1983]).

Adequacy of the REA Model. As expected, Figures 2–4 show that the REA model has been formulated at a higher level of semantics than the level found in the packages. Clearly, the mapping between the entities and relationships in the REA model and the entities and relationships in the packages is not one to one. Nonetheless, the more detailed entities and relationships of the package can still be *clustered* according to the higher-level entities and relationships of the REA model. In this sense the REA model fulfills its purpose as a *generalized* model, and it is a good predictor of the high-level semantics to be found in the packages. These results hold for all 12 packages examined.

However, the data analysis highlights a problematic aspect of the REA model if it excludes certain types of events from the domain it models. Figure 4, for example, shows an extraneous event—a contract—that links the economic resource with the economic agent. In the context of the REA model, this event is not an *economic* event if the model is confined to traditional accounting phenomena [McCarthy, 1982, p. 562]. Note, in particular, that there is no duality relationship for a contract. Nonetheless, the ability to model such events is an important capability needed by the users of accounting software (see, also, Cushing [1985]). If the REA model is confined to modeling only *traditional accounting* phenomena, it violates the spirit of events accounting [Sorter, 1969], which was a major motivation for the model in the first place.

There are at least two possible solutions to modeling "economic" events that fall outside the traditional accounting domain. First, a new entity type could be created to represent nonaccounting events. A duality relationship type would not be associated with this entity type (Figure 5). Second, for some

FIGURE 3
ERD FOR PACKAGE 2

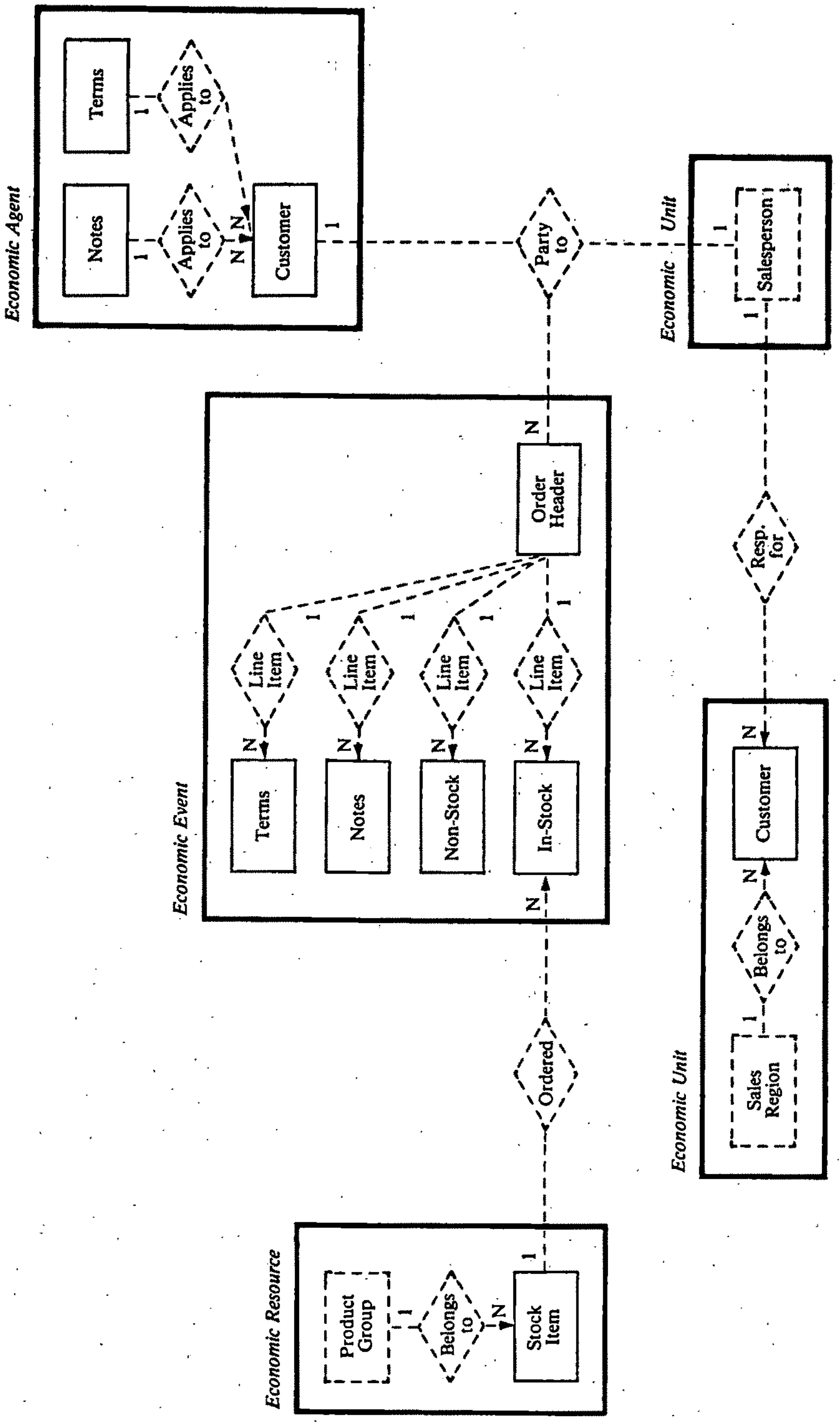
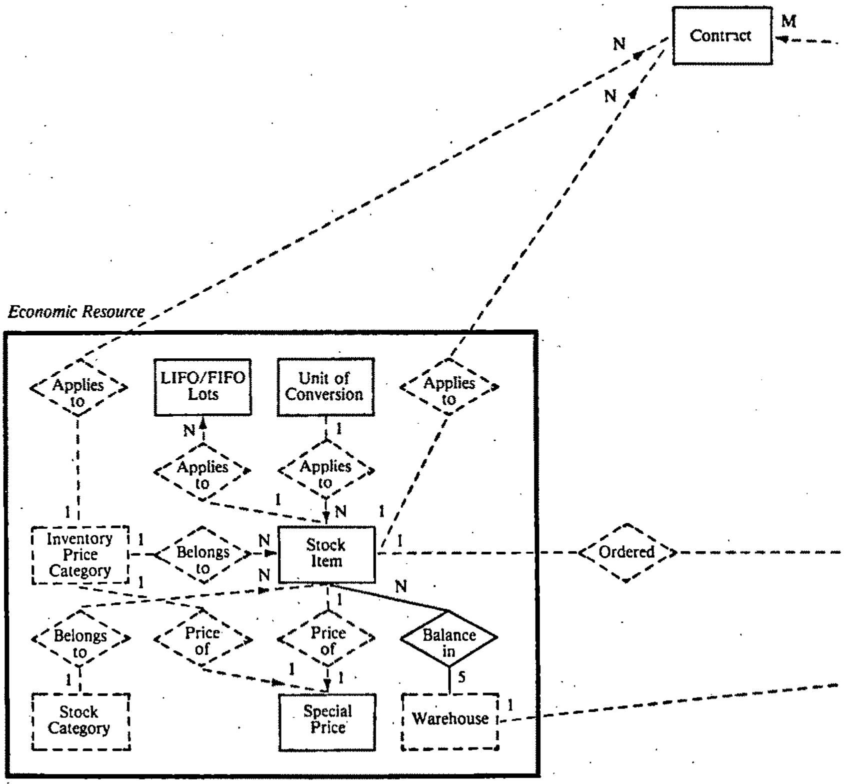


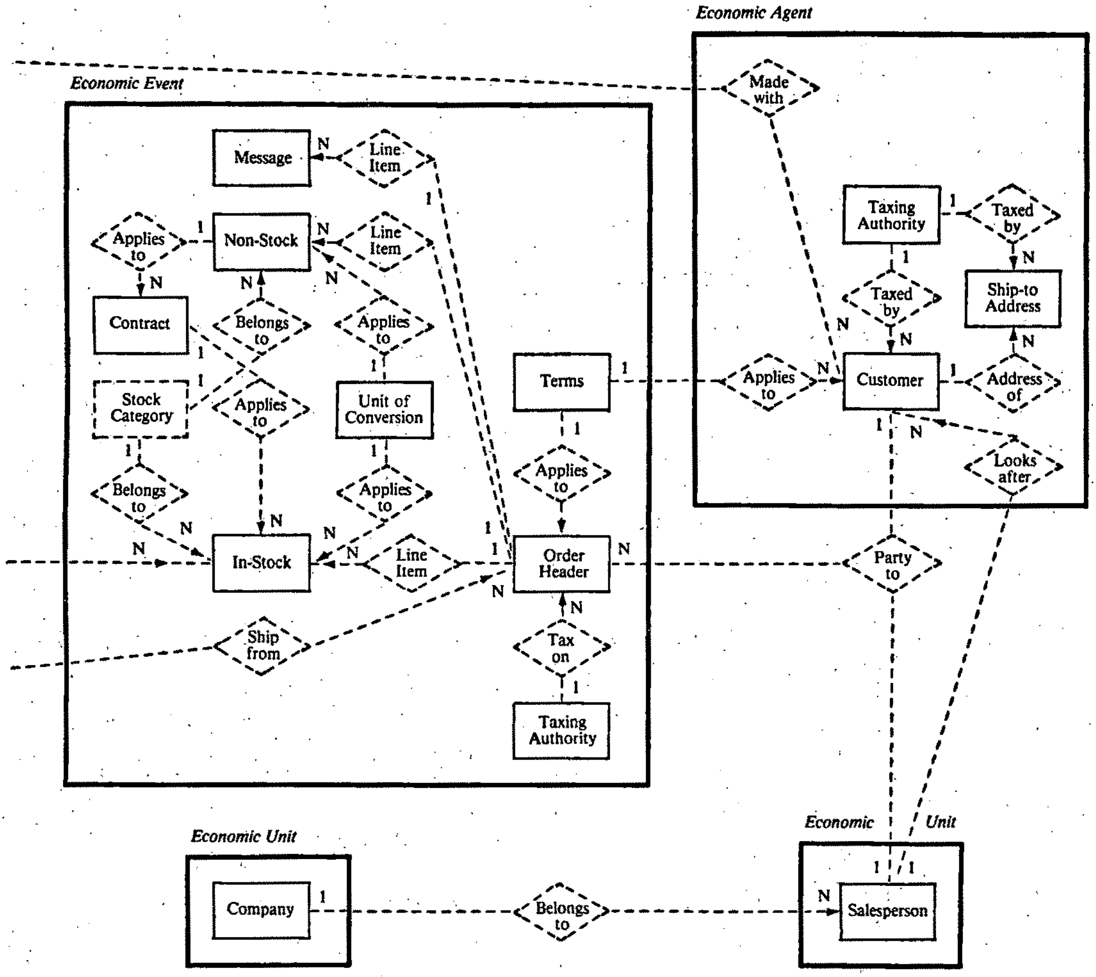
FIGURE 4
ERD FOR PACKAGE 3



events, Ijiri's [1975] recommendations could be followed, and the traditional resource change recognition criteria used by accountants could be modified to recognize *commitments*. Since commitment accounting can be undertaken within the context of the duality relationships used in traditional double-entry bookkeeping, the REA model does not need to be modified.

Commonality of the Detailed Semantics. Even though the packages have common high-level semantics, Figures 2–4 show that there are important semantic differences at a detailed level. Compare, for example, the description of stock item (economic resource) across the three packages. Packages 1 and 3 allow users to store information about the quantity-on-hand of each stock item at each warehouse. Package 2 provides no such facility. It assumes that all stock items will be stored at a single warehouse. Alternatively, only the aggregate

FIGURE 4—(*Continued*)

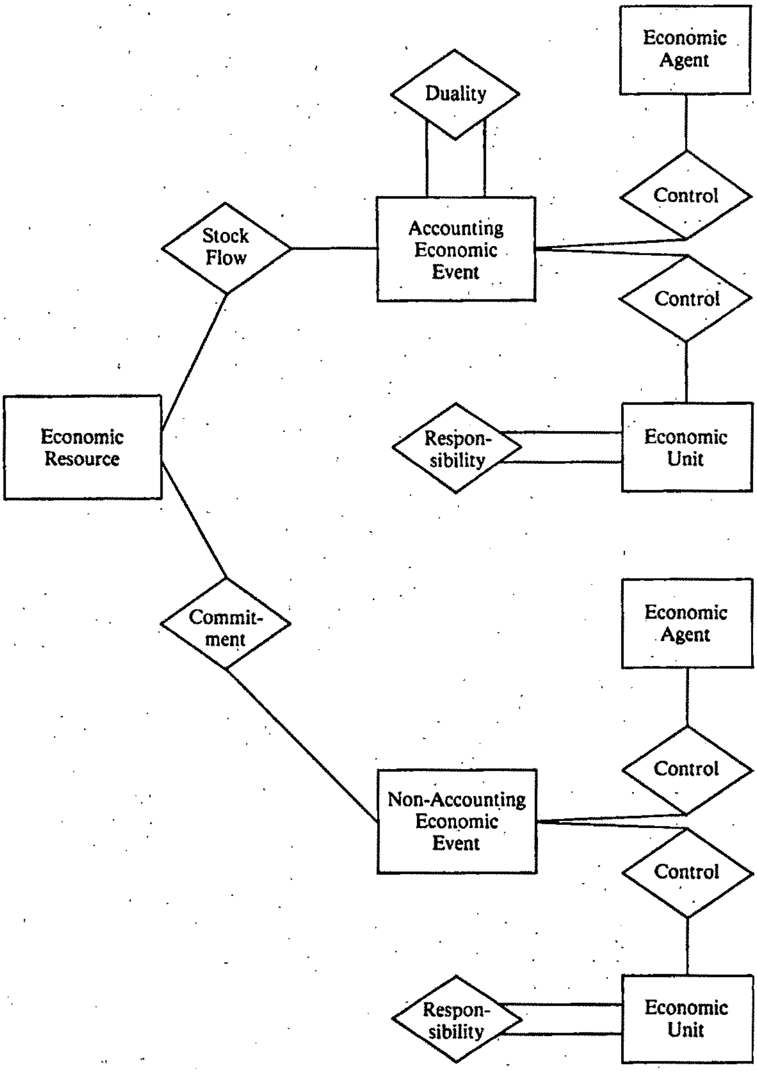


quantity-on-hand for a stock item can be stored, or the user must assign different stock item numbers to the same stock item stored at different warehouses.

Differences in the low-level semantics extend not only to the specific entities and relationships selected to represent the underlying semantic model but also to the richness with which common entities and relationships are described. For example, 33 data items are used to describe an Order Header relation in Package 1, whereas only 16 data items are used to describe an Order Header relation in Package 2. Tables 1-3 indicate that this variability extends to other entities and relationships which are common to each package.

Unfortunately, the REA model does not tease out these semantic similarities and differences because it is formulated at too high a level of abstraction. Nevertheless, as the stock item example above shows, similarities and differences in

FIGURE 5
MODIFIED REA MODEL



the low-level semantics have important implications for the relative ease with which the different packages can be used. On the one hand, this is a failing of the REA model in that common high-level semantics are not sufficient to motivate common low-level semantics, and it is in the low-level semantics that the quality of the design seems to be best manifested. On the other hand, it is doubtful whether the REA model can be articulated at a lower level of semantics without including entities and relationships that are specific to a particular accounting domain (e.g., order entry), in which case the generality of the model would be lost. Moreover, by clustering the low-level semantics of the packages

TABLE 1

NORMAL FORM VIOLATIONS IN PACKAGE 1

Record Type	No. of Fields	Violations				
		1NF	2NF	3NF	4NF	5NF
Sales Tax	3					
Price Discount	4					
Order Header	33	1				
In-Stock Line Item	19	1		4		
Non-Stock Line Item	22	1				
Comment Line Item	6					
Special Charge Line Item	14	1				
Shipping Instruction	7					
Customer	37					
Ship-to Address	17	2				
Stock Item	24					
Price of	19	2	1			
Balance in	29					
Warehouse	4					
Salesperson	4					
Sales Territory	4					
Customer Sales Category	4					
Customer Price Category	4					
Inventory Sales Category	4					
Inventory Price Category	4					

according to the high-level semantics of the REA model, semantic similarities and differences among the packages become apparent. The likely strengths and limitations of the package then become apparent.

Adequacy of the ER Modeling Technique. There were two difficult aspects to using the ER modeling technique to represent the semantics of the 12 packages. First, it was sometimes difficult to determine what objects were embedded in the record structures. This problem arose because, as indicated previously, the packages often used a single record to represent facts about more than one object. Second, as a related issue, the packages often used a single record structure to store data about multiple, heterogeneous objects. For example, a single line item record might have been used to store data about a stock item sold, a comment on an order, or a shipping instruction. In these situations, use of a single record structure sometimes muddied the underlying semantics; as a consequence, it was not always clear whether the individual objects were best treated as entity types or as relationship types (see, also, Kent [1979]). However, once the objects modeled by the packages had been identified and classified as either entity types or relationship types, constructing the ERDs was relatively straightforward.

Datalogical Results

Tables 1–3 show the extent to which normal form is violated in each record of Packages 1–3. Table 4 shows summary results for the 12 packages investigated. In the case of 1NF, each instance of a variable repeating field or each instance of a variable repeating group was

TABLE 2

NORMAL FORM VIOLATIONS IN PACKAGE 2

Record Type	*No. of Fields*	*1NF*	*2NF*	*3NF*	*4NF*	*5NF*
		Violations				
Terms	4					
Notes	2					
Stock Item	22					
Order Header	16			2		
In-Stock Line Item	7			1		
Non-Stock Line Item	7					
Customer	24			1		

counted as violation of 1NF; for example, a variable repeating group of three fields that had a maximum of five instances of the group would be counted as five violations of 1NF. In the case of 2NF–5NF, each field in each record was tested to see whether it violated normal form, and each violation identified was recorded.

In general, the packages contain few violations of normal form, given the number of fields in the packages. Moreover, while some violations might have serious update consequences, many can be understood in light of retrieval considerations. Overall, however, the package designers either have known formally or have realized intuitively the consequences of violating normal form. Thus, the theory is a good predictor of design practice, and the empirical evidence, in turn, supports normalization theory.

To illustrate the nature of the violations that did occur, however, consider Package 1. A violation of 1NF occurs in the Order-Header entity relation. Figure 1 shows that up to two salespersons can handle an order; that is, the package allows split commissions. The package handles this situation by a repeating group of two instances of the field "salesperson number" in the Order-Header relation. If a situation arises where more than two salespersons handle an order, the data structure is inadequate. Package 10 provides for up to three salespersons handling an order, but of course this data structure also may prove inadequate. Normalization theory prescribes that a separate record must be established to represent the M-to-N relationship between salespersons and orders.

A violation of 2NF occurs in the Price-Of record in Package 1. The key of the record is the pair (warehouse number, stock item number). The field "inventory price category" is a foreign key within the record; that is, it is a nonkey field in the Price-Of record but it is a key field in another record. However, inventory price category functionally depends only on a subset of the key, namely, stock item number. Thus, the record should be decomposed into two records. Indeed, the inventory price category simply could be placed as a field in the Stock-Item record.

Violations of 3NF occur in the In-Stock Line Item record of Package 1. The key of the record is the pair (order number, line number). The field "stock item number" is a foreign key within the record. Four fields functionally depend upon stock item number rather than the

TABLE 3
NORMAL FORM VIOLATIONS IN PACKAGE 3

Record Type	*No. of Fields*	*Violations*				
		1NF	*2NF*	*3NF*	*4NF*	*5NF*
Ship Via	3					
Taxing Authority	5					
Message	3					
Contract	13		1			
Order Header	26			4		
In-Stock Line Item	15			5		
Non-Stock Line Item	15					
Stock Item	31	2				
Special Prices	5	6				
Balance in	7	3				
Unit-of-Conversion	4					
Customer	38					
Salesperson	10					
Terms	5					
Ship-to Address	7					
Company (Territory)	*					
Order-Customer	3					
LIFO/FIFO	4	6				

* Record description not supplied

record key: unit cost of the item, pricing conversion factor, unit of order, and sales tax code (which is a repeating group with five instances). Interestingly, there are other fields that usually depend only on stock item number—for example, unit price—but users can override the values in these fields and, as such, they functionally depend on the key of the record. Where 3NF violations occur, normalization theory prescribes that the record be broken up into two records. In the case of the In-Stock Line Item record, the four fields that violate 3NF are stored already in the Stock Item Record. However, order lines often must be retrieved by the users of an order entry package—for example, they must be accessed and updated when customers change their minds and during order picking. If the data for an order line must be retrieved from several records, increased processing overheads arise. Thus, these violations of 3NF can be understood in the context of retrieval considerations.

No violations of 4NF or 5NF were identified in the packages. Whenever a multivalued fact occurs, the designers seem to recognize the update problems that can arise, and they embed each fact in a separate record. Thus, situations where 4NF and 5NF violations can occur are avoided by not combining independent multivalued facts in a single record.

Besides conforming to normal form in general, the packages also conform substantially to *optimal* normal form. Optimal normal form achieves three objectives: (a) minimum data redundancy; (b) minimum number of record types; and (c) absence of repeating fields or groups in records. The rules for generating optimal normal form are given by Falkenberg [1983]. Basically, any M-to-N binary relationship or any n-ary relationship ($n>2$) must be given a sep-

TABLE 4
NORMAL FORM VIOLATIONS IN ALL PACKAGES

Package No.	No. of Records	No. of Fields	Violations				
			1NF	2NF	3NF	4NF	5NF
1	20	262	8	1	4	0	0
2	7	82	0	0	4	0	0
3	18	194	17	1	9	0	0
4	17	251	6	2	17	0	0
5	25	303	19	0	2	0	0
6	15	226	8	0	5	0	0
7	7	100	0	0	5	0	0
8	18	469	21	3	5	0	0
9	14	298	15	22	4	0	0
10	14	285	3	0	18	0	0
11	20	194	2	0	4	0	0
12	13	250	8	0	12	0	0
Total	188*	2914	107	29	89	0	0

* Two record descriptions were not supplied

arate existence as a record type; and relationships that are one-to-one or one-to-N can be embedded in a single record type (see, also, Howe [1983]).

Figures 2–4 show that some relationship types are given a separate existence as a record type and others are embedded in a record type. For example, in Figure 2, the Discount relationship type is shown as a solid diamond, thereby indicating that it is a separate record within Package 1. Note that the Discount relationship type establishes an M-to-N relationship between the Customer Price Category and Stock-Item Price Category entity types and, to conform to optimal normal form, it *must* be given a separate existence as a record type.

On the other hand, note that in Figure 2 the Line-Item relationship type linking the Order-Header and In-Stock entity types is shown as a broken line with an arrow pointing to the In-Stock entity type. Recall, this indicates the Line-Item type is embedded with the In-Stock type in a single record type. Again, to conform with optimal normal form, Falkenberg [1983] shows that the Line-Item relationship type must be combined with the In-Stock entity type in a single record type.

Finally, the normal form violations that occur in the packages indicate a problem with the ternary control relationship proposed in the REA model. Recall that this relationship links the economic event, economic agent, and economic unit. However, note that the relationship between the Customer and Order Header entity types is a one-to-N relationship, and the relationship between the Salesperson and Order Header entity types is an M-to-N relationship where split sales commissions are allowed. Since the ternary control relationship is mapped into a single record, a 2NF violation occurs because the record contains a single-valued fact and a multivalued fact. The violation occurs because the record contains three fields (order number, salesperson number, customer number). To identify the split commission for a salesperson, the salesperson number and the order number are needed in the key, but the customer number is functionally dependent only on the order number. Thus, a 2NF violation exists.

In addition, if more than one customer can be associated with a single order (e.g., the customers formed some type of buying syndicate), the relationship between orders and customers is now M-to-N. Since the relationship between salespersons and orders is also M-to-N, 4NF is now violated since two independent multivalued facts are combined in the record. Thus, the ternary control relationship is problematical, and it is best represented in the REA model as two separate binary relationships (Figure 5).

CONCLUSIONS

In general, the results support the REA model as a high-level representation of the semantics incorporated in the order entry modules of existing wholesale distribution software. Furthermore, an important benefit of using the REA model and the ERM data modeling technique was the insight obtained into the semantic similarities and differences that existed among the packages investigated. The ERM data modeling technique provides a useful tool for representing the specific semantics underlying a package, and, at an aggregate level, the REA model provides a useful template for clustering these semantics to facilitate comparisons among the packages.

Using these tools, the results show that there are important semantic differences among the packages analyzed. Moreover, on the basis of the analyses made using these models, it is fairly easy to generate hypotheses about the strengths and limitations of a particular package. Future research might try to account for why these semantic differences have arisen, and why, given the widespread use of these packages, the differences have persisted. In addition, it might test whether the semantic strengths and limitations hypothesized are borne out by the experiences of the user population.

The results also identified three areas where the REA model could be extended, enhanced, or clarified. First, the model exists at a very high level of abstraction. As such, it is useful primarily to designers in the initial stages of data model development for an application system. Future research might attempt to refine the model to lower levels of abstraction, even if the model then becomes domain-specific. Second, it is unclear whether the model provides an adequate representation of nonaccounting economic events, particularly where the duality status of the events is uncertain. Future research might attempt to extend the domain of economic events represented by the REA model so it becomes a more useful tool in the context of events accounting. Third, the ternary control relationship shown in the model is problematic since it can lead to normal form violations. The difficulties that arise can be overcome by splitting the ternary relationship into two binary relationships.

Finally, at the datalogical level, the results indicate that the record structures implemented in existing accounting software conform substantially to normalization edicts. Moreover, where violations of normal form do occur, often they can be understood in the context of the retrieval operations that must be undertaken on the record. Thus, the results suggest that normalization theory either is used formally by designers or it articulates certain design principles that good designers intuitively have recognized already. Consequently, the theory has both prescriptive and descriptive value. However, the results also indicate that the designers of accounting software do not blindly follow the edicts of normalization theory. Performance issues need to be better understood. In this light, future research might investigate the nature and frequency of update versus retrieval operations on various classes of accounting data to determine the implications for data integrity if normal form is violated in record design.

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NOTES

Investment Decisions and the Equity Accounting Standard

Eugene E. Comiskey and Charles W. Mulford

ABSTRACT: This study tests the proposition that the 20 percent ownership percentage criterion for application of the equity method influences firm investment decisions. A sample distribution of firm investment positions indicates an unusually heavy concentration of positions at or near 20 percent. The characteristics of 19 to 19.99 percent investees (carried at cost) are then contrasted with 20 to 20.99 percent investees (carried at equity) on dimensions of profitability and earnings covariability. The results suggest that the extent-of-holding dimension of firm investment decisions is influenced by the ownership criterion. This finding implies that the underlying standard (APB 18) has an economic consequence. This result should be of interest to accounting scholars, as well as of potential value to the FASB as it reconsiders accounting standards for consolidations and the equity method.

This paper tests the proposition that firm investment policy is being influenced by Accounting Principles Board (APB) Opinion No. 18, *The Equity Method of Accounting for Investments in Common Stock* [APB, 1971]. More specifically, the paper seeks to determine whether the inclusion in APB 18 of the 20 percent ownership criterion for application of the equity method (hereafter the 20 percent standard) influences the ownership positions taken by investing firms.[1] Evidence of such an effect would imply that the accounting standard has an economic consequence.

The next section hypothesizes the effects of APB 18 on firm investment policy. The third section presents a sample distribution of firm ownership positions. Characteristics of 19 to 19.99 percent investees (carried at cost) are contrasted with 20 to 20.99 percent investees (carried at equity) in the fourth section. The

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[1] FASB Interpretation No. 35, *Criteria for Applying the Equity Method of Accounting for Investments in Common Stock* [FASB, 1981], emphasizes the need for judgment in determining whether a particular ownership position provides an investor with significant influence, which, when present, calls for the application of the equity method. However, the Interpretation left in place the 20 percent standard and the presumption, in the absence of predominant evidence to the contrary, of significant influence when the standard is met.

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paper concludes with a discussion of the findings which support the proposition that firm investment policy is influenced by APB 18.

ACCOUNTING MEASURES AND INVESTMENT POLICY

Contractual agreements are often employed to resolve agency considerations or conflicts of interest which arise between management and shareholders, or between shareholders and bondholders [Jensen and Meckling, 1976]. Often, accounting measures of earnings and financial position serve as the basis for these agreements, as in bonus compensation plans and debt covenants.

In the presence of such contractual agreements, risk-averse, wealth-maximizing managements can be expected to use investment policy (i.e., ownership percentages giving consideration to the 20 percent standard) to achieve desired effects on accounting measures of earnings and financial position. For example, given the information a firm has and its portfolio balancing desires, a 25 to 30 percent acquisition may be optimal. If, however, the prospective investee is reporting losses and it is anticipated that these losses would continue in the near future, then application of the equity method would have negative effects on the investor's earnings and financial position. This could adversely affect management's incentive compensation and/or move the firm closer to violation of its earnings-related debt covenants. Weighing these factors, management might consider acquiring less than a 20 percent interest, enabling the firm to apply the cost method. Similarly, management might consider obtaining less than a 20 percent interest in an investee reporting a highly variable income stream to avoid, among other things, a more variable stream of management compensation.

An ownership interest of just over 20 percent might be desired if the investee is profitable and added accounting income has value to the managers. The point is that the combination of APB 18 and agency considerations have provided an incentive for some managements to steer their investment policy toward either marginally qualifying for, or marginally avoiding, the equity method. Testing the proposition that managements have responded to that incentive is the objective of the current study.

SAMPLE DISTRIBUTION

If firm managements are using investment policy either to marginally qualify for or to avoid the equity method, then one would expect to observe the frequent occurrence of investment positions in the vicinity of 20 percent. Descriptive evidence supporting such an observation is provided in Figure 1.

Figure 1 provides a sample distribution of ownership positions taken by investor firms in 1982. The distribution includes all companies listed in Standard & Poor's [1982].[2] Standard & Poor's service was selected because it provided a representative cross-section of firms of varying size, industry membership, and share-trading market. For each firm in the 1982 volume, the identity and stockholding of every investor, excluding those not subject to APB 18, with a voting interest of between five and 50 percent inclusive was noted.[3] Each stock-

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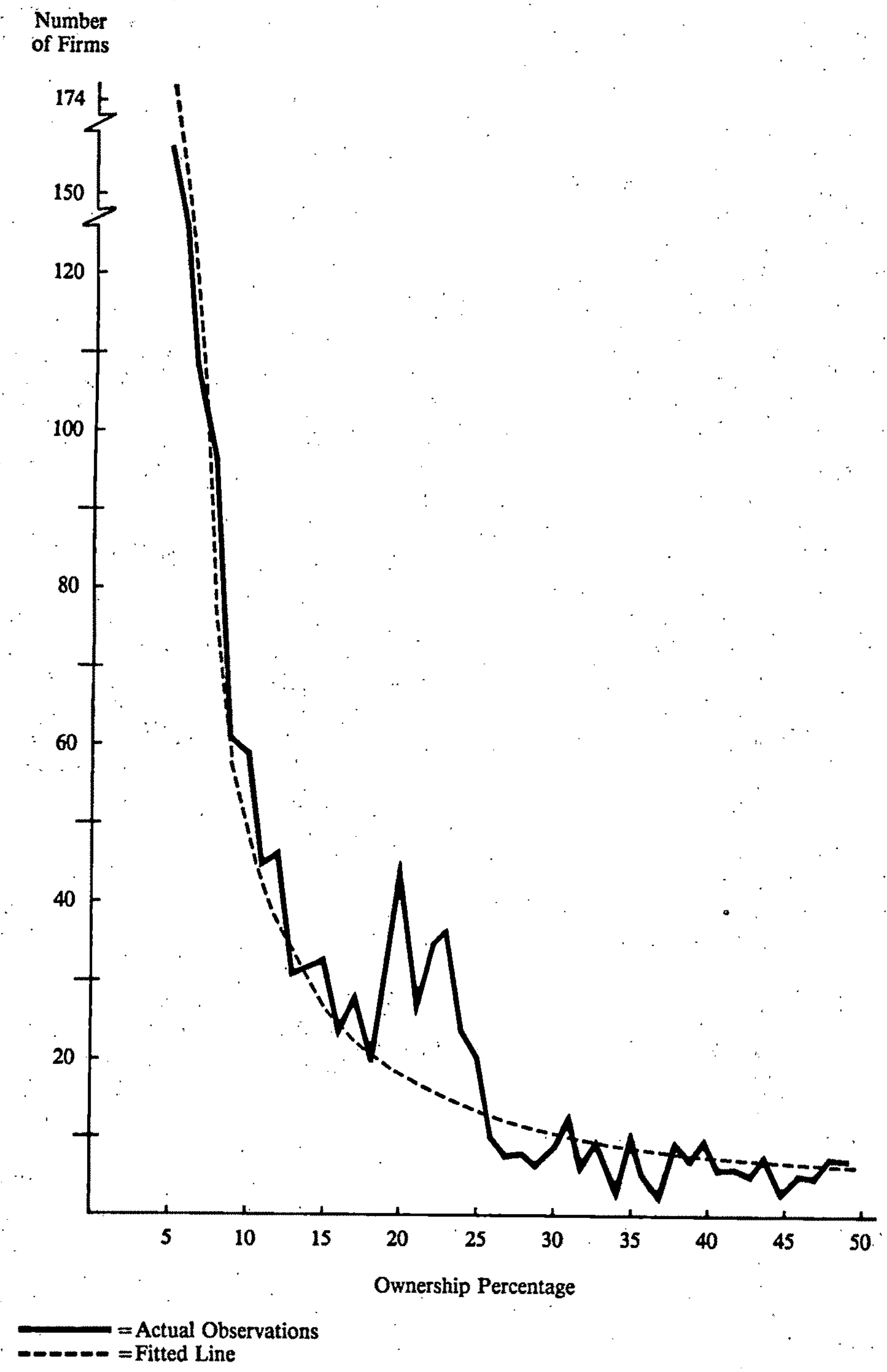
[2] The actual volumes of the Standard & Poor's service examined were the volumes dated April, July, and October 1982 and January 1983.

[3] The stockholder record dates for the firms examined ranged from the second quarter of 1981 through the second quarter of 1982. Investors not subject to APB 18 included individuals, trusts and estates, and investment companies.

FIGURE 1
OWNERSHIP PERCENTAGE DISTRIBUTION: 1982 DATA



holding was placed into an ownership percentage cell of one percent in width (e.g., the 20 percent cell represented all investment positions of between 20 percent and 20.99 percent, inclusive).

Stock data records for over 8,000 firms were examined. Subject to the five to 50 percent screen and exclusion of holdings by non-equity-accounting investors, a distribution consisting of 1,255 ownership-percentage data points was developed.

Foreign investor holdings were included in the ownership percentage distribution. This is appropriate in view of the widespread international application of the 20 percent criterion. Of the 84 foreign investors in the sample, 80 were identified as clearly falling under an equity-accounting standard which was equivalent to APB 18.

Figure 1 depicts the pattern of ownership. A comparable distribution constructed using pre-APB 18 [1969] data is presented in the Appendix. To determine whether investment positions occur with unusual frequency in the vicinity of 20 percent, a "best-fit" regression equation was superimposed on the ownership percentage distribution in Figure 1. The number of firms observed in each ownership percentage cell was regressed upon the ownership percentage midpoint of that cell:[4]

$$y_i = 5.24 + 5129.7(x_i)^{-2} + e_i \qquad \bar{R}^2 = .97 \quad (t = 34.3) \tag{1}$$

where

y_i = number of firms observed at i^{th} ownership percentage cell, and

x_i = midpoint of the i^{th} ownership percentage cell.

Excluded from the data employed in the regression were ownership percentage cells which were potentially sensitive to APB 18. Percentage cells considered sensitive to APB 18 were those of 16 to 23.99 percent. These cells were viewed as best representing investment policy which, at the margin, qualifies for the equity method (20 to 23.99 percent) or avoids it (16 to 19.99 percent).[5]

As indicated in Figure 1, a considerable number of investor firms appear to be concentrated in ownership percentage cells that fall within the sensitive region (16 to 23.99 percent). The regression equation in (1) was used to predict an expected number of investing firms for each of the ownership percentage cells within this region. As noted in Table 1, the number of investing firms concentrated in the cells of 19–19.99, 20–20.99, 21–21.99, 22–22.99, and 23–23.99 percent is significantly greater than expected.

The existence of the 20 percent standard provides a potential explanation for the heavy concentration of investor firms in the sensitive region. Firms may be using investment policy either to marginally qualify for, or to avoid, the equity method. To provide a more definitive test of this contention, the characteristics of investees in the 19 to 19.99 percent (cost method) and 20 to 20.99 percent (equity method) cells were examined.

CONTRASTING COST METHOD AND EQUITY METHOD INVESTEES

The ownership percentage cells of 19 to 19.99 and 20 to 20.99 percent served as the focus for the tests reported in this section. As noted, these cells were viewed as best representing investment policy which, at the margin, qualifies for the equity method (20 to 20.99 percent) or avoids it (19 to 19.99 percent).

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[4] An iterative search process was used to select the form of this equation. Adjusted R^2 was employed as the "best-fit" criterion.

[5] The general form of the regression equation was not sensitive, however, to the selection of cells for exclusion.

TABLE 1

SIGNIFICANCE TESTS OF CONCENTRATIONS OF INVESTING FIRMS IN SENSITIVE REGION

Ownership Percentage	*Number of Firms Observed*	*Number of Firms Predicted*	*Difference*	*Z Value*	*Significance Level*
16–16.99	24	24.08	−.08	−.01	—
17–17.99	28	21.99	6.01	.93	—
18–18.99	20	20.23	−.23	−.04	—
19–19.99	33	18.66	14.34	2.21	.014
20–20.99	44	17.44	26.56	4.10	.000
21–21.99	27	16.34	10.66	1.64	.051
22–22.99	35	15.37	19.63	3.03	.001
23–23.99	37	14.53	22.47	3.47	.000

If managements consider accounting measures of earnings and financial position in establishing ownership positions, systematic differences between 19 to 19.99 percent investees (carried at cost) and 20 to 20.99 percent investees (carried at equity) can be expected. For example, some investees might be expected to report more frequent net losses and/or to add more variability to investors' income streams than others. By applying the cost method to such investees, managements of investor firms could reduce the negative impact of losses and variable income streams on, among other things, incentive compensation schemes and the fulfillment of debt covenants.

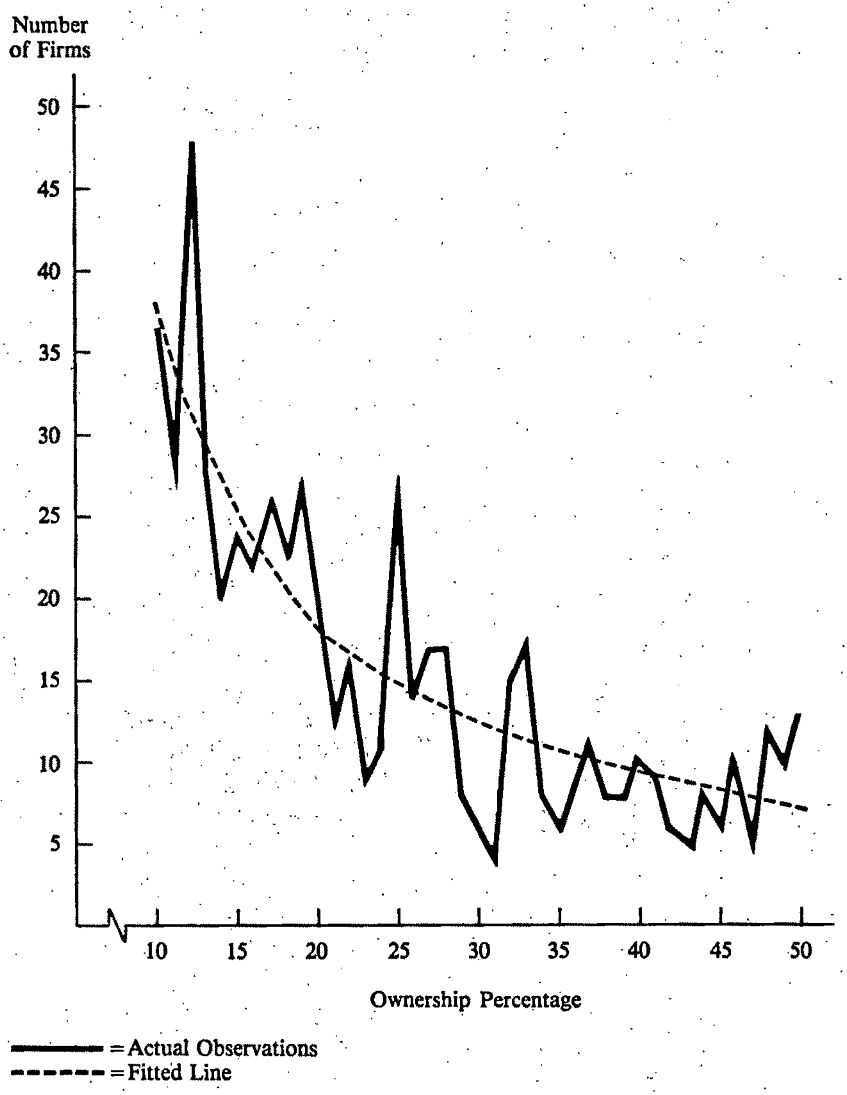
The first test of this proposition contrasted the proportion of reported net losses before extraordinary items for the 19 to 19.99 percent investees with those of the 20 to 20.99 percent investees. Investees used had at least four consecutive years of data in the period 1975 through 1982. The final subsample consisted of 29 of the 33 firms in the 19 to 19.99 percent cell and 40 of the 44 firms in the 20 to 20.99 percent cell. For each firm, the proportion of losses during the test period was computed by dividing the number of years for which a loss was reported by the total number of years for which income data were available.

The mean (median) loss proportion observed for the 19 to 19.99 percent firms was 30.4 percent (25.0 percent) versus 16.1 percent (12.5 percent) for the 20 to 20.99 percent firms. The proportion of losses was significantly greater for the 19 to 19.99 percent firms than for the 20 to 20.99 percent firms at the .016 level, using the Mann-Whitney *U* test.

The second test examines the covariability of investee earnings with earnings of the investor. Managements of investor firms can be expected to prefer application of the equity method to investees' income streams which exhibit low (or even negative) correlations with their own. Such income streams would not contribute greatly to (or may even reduce) the investors' earnings variability.[6] Using this line of reasoning, net incomes of firms in the 19 to 19.99 percent cell would be expected to be more highly correlated with their respective investors' earnings than firms in the 20 to 20.99 percent cell.

[6] A management preference for that method of investment accounting which reduces earnings variability was documented previously in Barefield and Comiskey [1972].

FIGURE 2
OWNERSHIP PERCENTAGE DISTRIBUTION: 1969 DATA



In a test of this proposition, firms were included only if at least eight consecutive years of net income before extraordinary items were available for each investee and related investor. This severe data constraint limited the sample to seven 19 to 19.99 percent investees and fifteen 20 to 20.99 percent investees. The mean Pearson (Spearman) correlation coefficient between investee and investor net income was .224 (.260) for the 20 to 20.99 percent investees and .340 (.360) for the 19 to 19.99 percent investees. While these correlation coefficients were in the expected direction, the Mann-Whitney *U* test was unable to reject the null hypothesis that they were drawn from the same population.

Conclusion

This study provides evidence which supports the hypothesis that the 20 percent equity-accounting standard has an effect on firm investment decisions. The topic of equity accounting is currently an active subject of review by the FASB. Our results suggest that the FASB should examine the 20 percent equity-accounting standard because it has the potential for producing real economic consequences.

Appendix

Figure 2 depicts the shape of an ownership percentage distribution constructed using 1969 data (pre-APB 18). While this figure provides an interesting contrast with Figure 1, care should be exercised in examining it. Changes in investment policy, unrelated to the introduction of the 20 percent standard, may have altered the shape of the distribution. Further, Standard & Poor's reporting of stockholdings may have become more inclusive.

Based on the best-fit regression equation, the 1969 data exhibit more variability and less slope than the 1982 data:

$$Y_i = -.87 + 401.06(X_i)^{-1} + e_i \quad \bar{R}^2 = .71 \qquad (2)$$
$$(t = 8.85)$$

Potential structural differences between 1969 and 1982 notwithstanding, the 1969 distribution exhibits no unusual concentration of ownership (at $\alpha = .05$) in the sensitive region.

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FINANCIAL REPORTING

Interpreting Hospital Performance with Financial Statement Analysis

H. David Sherman

ABSTRACT: Rising hospital costs are of increasing concern to government and industry. The growth and financial success of for-profit hospitals (FPs) in an industry that was once solely populated by nonprofit hospitals (NPs) have suggested that FP business practices may be a more cost-effective way to manage health care services. However, studies using accounting and other operating data yield conflicting and ambiguous conclusions that do not resolve questions about relative performance of FPs vs. NPs. A comparison of FP and NP financial statements suggests that current financial reporting methods can be misleading, or at best of little help, in assessing the performance and cost structure of the two types of hospitals. The key problem is that financial statements prepared according to present standards do not provide sufficient information for accurate comparative analysis of FPs and NPs. Additional data about volume and output mix and about the financial impact of differences in legal status are needed to make hospital financial statements relevant and useful for understanding and containing health care costs.

THE U.S. hospital industry was originally composed exclusively of non-profit hospitals (NPs). However, since 1970 there has been an increasing presence of for-profit (investor-owned) hospitals (FPs). While at present for-profit hospitals comprise only about ten percent of all U.S. hospitals, the number of FP beds increased by 64 percent versus 17 percent growth for NPs over the decade ending in 1980, and FPs now account for more than 20 percent of the hospitals in the Sun Belt region of the U.S. [American Hospital Association, 1981]. Due to their favorable growth, strong management, and profitability performance, FPs have often been highly recommended as equity investments [Frost and Sullivan, 1982; Sandomir, 1981; Hull, 1985].

Concomitant with this development has been the rapid growth in U.S. health care costs. As part of the effort to develop better ways to regulate and manage the costs of hospital services, considerable attention has been focused on the favorable financial performance of FPs and its implications for the future in relation to the management, cost, and quality of health care:

1. Does the profit motive result in greater efficiency and a better managed hospital?

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2. Will further growth in FPs result in higher or lower health care costs?
3. Do FPs provide lower quality health care because their primary objective is profit rather than service? (See, for example, *Boston Globe* [1983, 1984] and Altman [1984]).

Since the U.S. is committed through large subsidies to maintain access to health care regardless of ability to pay, answers to these questions can have significant public policy impact. Hospital costs must be accurately analyzed to determine whether legislative incentives should be shifted away from NPs to FPs as a means of reducing health care costs.

Managing health care costs is also a serious concern of corporations, as the cost of health insurance fringe benefits continues to increase. Chrysler Corporation reported that its 1983 health insurance costs were $6,000 per year per employee, which was double the 1979 cost [Rosenbaum, 1984].

Finally, these questions have important implications for hospital management: If FPs are less costly, can NPs adopt FP management techniques and reduce their costs without sacrificing the quality of care? (The strong and emotional polarity of views on the merits of FPs versus NPs is demonstrated in Dorfman [1982], Goldsmith [1981], Keenan [1981], Kinkead [1980], Siafaca [1981], Starr [1982], and White [1979]).

Accounting analysis can play an important role in assessing the relative performance of NPs and FPs. However, there are important differences in the financial disclosure requirements and accounting methods of the two types of hospitals. FPs must meet corporate accounting standards and in many cases SEC disclosure requirements as well. In contrast, NPs are guided by fund accounting disclosure requirements for hospitals, and municipal accounting requirements often apply for government-owned NPs. (See, for example, AICPA [1972, 1974, and 1980].) In addition, hospitals provide a complex mix of services and patient care. Fair comparisons of hospitals require careful disaggregation of cost differences due to the volume and mix of health care services provided. As will be demonstrated in the following discussion, there is good reason to question whether presently available accounting data can be used in a manner that will provide accurate answers to the questions posed above. Certainly, analysis of such data has not yet yielded any significant insight into relative hospital performance, the nature of hospital cost increases, and ways to contain these costs.

To clarify the potential contribution of accounting to the resolution of these issues, this paper addresses the basic problems associated with the analysis of FP and NP performance: Do the inconsistent disclosure requirements and accounting methods used by FP and NP institutions affect the ability to evaluate the relative performance of these organizations? Are additional or more consistent disclosure requirements needed to help assess the impact of the increased presence of FPs on health care costs? In the first part, various studies completed over the past decade are reviewed to demonstrate how questions about performance have been addressed and the ambiguous conclusions that have resulted because of deficiencies in presently available accounting data and the lack of necessary adjustments. In the second part, actual financial statements are examined and adjusted in various ways to determine the kinds of information necessary to resolve the questions of whether FPs or NPs are less costly, more efficient, and better managed. A controlled environment was used so that actual performance and data underlying the financial statements were available to assess the accuracy of conclusions based on financial statement analysis.

This comparison leads to certain conclusions about the types of disclosures and accounting policies that are needed if analyses of financial statements are to yield accurate assessments of the relative performance of FPs and NPs. It is clear that more basic disclosures about outputs, payor mix, and costs are needed to make FP and NP financial statements useful for evaluating performance. The revised disclosure requirements identified in this study will help to clarify the cause of cost increases, which in turn may lead to ways to contain hospital costs.

LITERATURE SURVEY

Studies comparing FP and NP hospitals have generally focused on four dimensions of performance: quality, cost of operation, fees charged for services, and operating efficiency. Current knowledge as reflected in studies published in the past ten years is reviewed below for each of these four areas. Appendix A summarizes the results of studies addressed in this literature review. As background for this literature review, the differences between NP and FP hospitals that can affect the financial and operating performance are summarized in Appendix B. In short, the key advantage of FPs is their access to equity capital markets. On the other hand, NPs can attract donated capital and services and issue tax-exempt debt at lower interest rates. NPs also do not have to pay income and property taxes.

Quality

In spite of concern that quality of care may be sacrificed to enhance profits, studies of FPs vs. NPs document no ascertainable quality differences. These studies have used several measures of quality including accreditation [Steinwald and Neuhauser, 1970], incidence of malpractice claims, possession of high-prestige technology, existence of suspect practices [Clark, 1980], and death rates [Bays, 1977].[1] It has also been suggested that FPs' greater access to equity capital markets allows them to finance the purchase of state-of-the-art equipment, which promotes quality by attracting physicians and increasing the types of care available [Frost and Sullivan, 1982; Riffer, 1981]. However, the results of existing studies suggest that any cost differences found among FPs and NPs are *not* primarily due to quality differences. FPs and NPs both need to maintain high quality levels to satisfy physicians, or they risk losing patients; there is no evidence that ownership type or corporate control has any effect on the quality of care [Harris, 1977]. The dimensions of health care quality are broader than those tested in these studies (see, for example, Steinwald and Neuhauser, [1970], Dumbaugh, [1978], and Donabedian, [1978]). However, unless new definitions of quality are developed that are more rigorous, comprehensive, measurable, and widely accepted than those noted above, there appears to be no basis for further examining this dimension.

Cost

Studies of FP vs. NP costs provide conflicting evidence about relative hospital costs. Several studies found that NPs had lower *costs per day* than FPs [Bays, 1979; Clark, 1980; Lewin et al., 1981;

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[1] One earlier study [Ruchlin et al., 1973] did find that NPs have lower quality based on death rates, unadjusted for case mix. This was refuted in a later study [Bays, 1977] that adjusted for case mix.

Pattison and Katz, 1983]. Another study reported that FPs and NPs have similar costs per day but that FP chains have lower cost per day than independent FPs and NPs [Sloan and Vraciu, 1983]. The cost per admission is also considered in these and other studies, which also yield conflicting results.[2] The cost per admission of FPs has been reported to be below [Clark, 1980], approximately the same as [Bays, 1979; Sloan and Vraciu, 1983], and above that of NPs [Pattison and Katz, 1983]. In addition, in two studies that segregated chain from independent hospitals, FP chain costs per admission were lower than those of NPs [Sloan and Vraciu, 1983; Bays, 1979] while another study found the opposite [Coyne, 1982].[3]

One reason for these conflicting conclusions is that these studies do not all examine the same hospitals during the same time period. However, this does not account for all the discrepancy. The ambiguous results primarily derive from four basic problems found in all of these cost studies. First, the studies do not consistently adjust for the NPs' cost advantages arising from their legal status —specifically, the lower interest rates paid on tax-exempt debt, the exemption from income and property taxes, the availability of tax-deductable donations for capital and operating expenditures, and the value of donated services provided to NPs. Second, the price level effects on depreciation and borrowing costs associated with the timing of capital asset purchases and lease contracts are not considered. Third, no consideration is given to the possibility that certain NP expenditures that are funded by restricted gifts and endowment income would not have been incurred if these restricted funds were not available; in such a situation, the true cost of operations for the NPs would be less. Finally, the case mix is not explicitly measured; hence, the output mix and relative costliness and amounts of resources needed to treat different types of illnesses are essentially ignored. In most studies the number of services offered is used as a case mix surrogate; in only one study [Bays, 1979] is a case mix severity index developed to control for output mix.

Correcting for the cost differences due to variation in interest rates, tax subsidies, and price level effects would have been difficult but possible with the cooperation of the hospitals. Case mix data have, however, been essentially unavailable. The deficiencies of these studies are primarily due to the absence of these necessary adjustments. The data critical for assessing the relative cost of NPs' and FPs' financial statements cannot be derived from the financial statements. There is no disclosure of property taxes, patient volume, case mix, price level effects, or the operating impact of donated funds and services.

Fees and Charges

Another unresolved question is whether FPs charge more for services regardless of whether the services are more costly. There appears to be evidence that FPs apply higher markups than NPs, which would contribute to their attractive earnings record [Lewin et al., 1981]. However, whether FPs thereby have higher fees depends on their relative costs; if FPs have lower costs, then even with higher markups they may still have lower fees. FPs were found to have higher charges by Lewin et al. [1982] and Pattison and Katz [1983], but this is contradicted by Sloan and Vraciu [1983], who reported that charges were lower in chain FPs with no difference between independent FPs and NPs.

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[2] Cost per day and cost per admission are both used as performance measures because FPs have generally had shorter lengths of stay which can result in lower cost per patient even if their cost per day is higher.

[3] In addition to the original articles, a detailed summary of these studies can be found in Sherman and Chilingerian [1984].

Further complicating the inconsistent findings of these studies is the lack of adjustment for case mix *and* payor mix. The payor mix affects net patient revenues, since various payors such as Medicare, Medicaid, and often Blue Cross pay hospitals for services at rates that are below the hospitals' standard fee schedules. Financial statement disclosures are silent on the question of payor mix and the fee discount by payor, which seriously impairs their usefulness in comparing the margins of FPs vs. NPs. There is some evidence that FPs practice "cream skimming," whereby they selectively position their hospitals to attract a patient case mix and payor mix that will maximize profits (see, for example, Bays [1977] and Lewin et al. [1982]), although this has been denied by some FPs (see, for example, Brown [1981]). These mix factors are not controlled for in these studies, and consequently definitive answers about relative fees and the existence of cream skimming are unavailable.

Operating Efficiency

Operating efficiency has been defined and measured in many different ways. While it can be viewed as one aspect of the cost of operations, it has, nevertheless, been a focus of many studies attempting to evaluate management's deployment of physical assets and human resources as distinct from the amount paid for these resources. It has been argued that NPs' operating efficiency is inferior to that of FPs because of a lack of business discipline among non-profit managers [Clark, 1980]. This view is supported by Frost and Sullivan [1982], who suggest that FP chains have "staffing controls highly responsive to demand as well as controls to help limit the length of stay." The shorter lengths of stay of FPs may reflect greater efficiency but may equally be due to case mix differences as discussed above. Kushman and Nuckton [1977] found that FPs respond more quickly than NPs in adjusting their bed stock to the demand for care, which is another dimension of efficiency.

Studies that examined operating ratios also suggest that FPs are generally more efficient. For example, Lewin et al. [1982] found full-time equivalents of personnel per patient to be lower in FPs, suggesting more efficient scheduling and job allocation. Lewin also found that FPs utilized lower fixed assets per patient day. Coyne [1982] reported that FPs have greater admissions per bed but that personnel utilizations are not significantly different among hospital types (FPs vs. NPs and chains vs. independents).

These operating efficiency studies lack specific case mix data. The nonfinancial data used are not subject to audit and may have inaccuracies or inconsistencies that could bias any conclusions. Moreover, little insight is provided into the nature of operating differences that may exist and whether such differences are attributable to management practices in the NP and FP environments. One exception to this [Wilson and Jadlow, 1982] focused on one area—Nuclear Medicine —and found the FPs to be more efficient in resource utilization than NPs for that one service. Sherman and Chilingerian [1984] circumvented the cost and case mix output data problems and examined the frequency of use of a set of "good management techniques." They found that FPs made greater use of shared services, bidding procedures for purchasing, demand forecasting, and other basic business management techniques, but the manner in which health care services were provided by FPs and NPs did not appear to differ.

Summary

These studies demonstrate the need to consider data not presently included in the financial statements when comparing the relative performance of FPs and NPs. While some attempts were made to correct for inconsistencies and unavailability of data, the studies were generally completed by individuals who are not primarily involved with accounting disciplines, and accounting and disclosure issues were not a focus of their analysis. The result is a lack of any firm conclusions about the relative costs, fees, and operating efficiencies of FPs vs. NPs. Consequently, the public debate about the relative merits of FPs vs. NPs and their impact on health care costs is primarily based on emotional and qualitative judgments.

The next section addresses two questions: (1) Can the relative performance of hospitals be more objectively understood through careful analysis of hospital financial statements? and (2) What disclosures are critical for performance evaluation, and are these presently included in FP and NP financial statements?

ANALYZING HOSPITAL FINANCIAL STATEMENTS TO EVALUATE PERFORMANCE

The purpose of this section is to investigate the types of conclusions about performance that one can derive from analyzing NP vs. FP financial statements. Where the data are found to be inadequate, the additional data that would make the financial statements a useful tool for performance evaluation are identified.

The most straightforward approach of using a set of actual statements of FPs and NPs would be unlikely to provide the insights needed for the following reasons:

1. The output mix of patients and payors of the hospitals would not be readily available. While hospitals might cooperate and provide payor mix data, there are few hospitals in the U.S. that have complete and accurate patient case mix data in an accessible form, since they were not required in the past. Case mix data are now needed for Medicare reimbursement which applies only to patients over 65 years old. Hospitals are only now beginning to voluntarily maintain these data on a hospital-wide basis.
2. Other types of data are needed to confirm the accuracy of a hospital performance evaluation. This would require a great deal of cooperation and analysis on the part of each hospital. These problems are more fully documented in Sherman [1984].

Instead of using a set of FP and NP statements, it was decided to focus on a single NP hospital that could provide extensive analytic data about its operations.[4] The audited financial statements of a nonprofit teaching hospital for 1982 and 1983 were therefore used for this study. The statement of revenues and expenses was reorganized to accommodate this analysis and is reproduced as

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[4] The hospital used in this study is an urban teaching hospital with between 400 and 500 beds. It is not representative in that less than ten percent of U.S. hospitals have over 400 beds [AHA, 1982] and most hospitals are not teaching institutions. With very few exceptions, FPs are not teaching hospitals. To some extent, it is the size of the management staff and the analytic bent of this teaching institution that resulted in the availability of extensive analytic data about its costs, output volume, and mix. Although this hospital may be considered atypical, the problems addressed through use of its data are typical of all FP and NP acute care hospitals with two exceptions: (1) The teaching activities generate operating costs that would be absent in non-teaching hospitals; and (2) There is a great deal of grant-supported research which would be absent in most nonteaching hospitals. Comparison of teaching and nonteaching hospital costs would require adjustment for these two activities.

Appendix C. The 1982 statement was adjusted for specific price level changes to reflect 1982 operations as they would have appeared with fee and cost level changes experienced from 1982 to 1983. The sizes of these price level changes for each revenue and expense category were provided by management based on internal documents reflecting actual fees and salary cost changes. Construction cost changes and other changes that could not be internally estimated were adjusted by the regional consumer price and construction cost indices. Each adjustment is documented in the numerical footnotes accompanying Appendix C.

To compare FP vs. NP hospital operations, the 1983 financial statement of the NP was recast to reflect the likely impact of a change in legal status from an NP to a FP hospital. These changes include the addition of property and income tax, elimination of donated services and cash gifts, added revenues provided by Medicare in the form of higher reimbursement rates to provide FPs with a return on equity, and the higher interest rates that would result from the absence of tax-exempt debt. These changes are described in the alphabetic footnotes accompanying Appendix C.

Thus, the following four statements of revenues and expenses provide the data for this study:

1. 1982 NP data as reported in the Financial Statement
2. 1982 NP data adjusted to reflect 1983 price levels
3. 1983 NP data as reported in the Financial Statement
4. 1983 FP data derived by revising the 1983 NP Financial Statement

The analysis proceeds in three parts as follows:

Part 1: NP vs. NP over two consecutive years

1982 and 1983 NP statements are compared to determine the extent to which actual financial statement data and price level adjusted data can be used to accurately identify trends and changes in operating relationships and to evaluate whether performance has improved (a comparison of statement 3 with statements 1 and 2).

Part 2: FP vs. NP with identical output mix in the same year

The FP is compared with an NP with identical output mix and operating methods to estimate the impact of legal status on operating costs (a comparison of statements 4 and 3).

Part 3: FP vs. NP with different output mix in the same year

The FP is compared with the NP for 1982 adjusted to reflect 1983 prices (a comparison of statements 4 and 2). This comparison demonstrates the impact of a different output volume and mix on conclusions reached about relative performance of FPs and NPs; it most closely reflects the type of analysis attempted in the studies described above.

Part 1. 1982 vs. 1983 Operations of the NP Hospital Before and After Price Level Adjustments

How does the 1983 financial performance of the NP compare with that of 1982 based solely on the financial statement disclosures? Table 1 summarizes elements of the financial statements in Appendix C that will be used for this analysis and provides added data that were needed to make this assessment.

The income statement data in columns

TABLE 1

COMPARISON OF THE NONPROFIT HOSPITAL—1983 VS. 1982
(DATA EXCERPTED FROM APPENDIX C)

	A *1982*		*B* *1983*		*C* *PLA 1982***	
Income Statement Data	*%*	*(000's)*	*%*	*(000's)*	*%*	*(000's)*
Gross patient revenues	135.6	$152,897	134.5	$171,602	135.6	$166,636
Less:						
Contractual adjustments	27.0	30,477	27.4	34,970	27.0	33,218
Unreimbursed care	3.5	4,028	3.0	3,860	3.5	4,391
Provision for uncollectable accounts	5.1	5,669	4.1	5,211	5.1	6,179
Net patient revenue	100.0%	112,723	100.0%	127,561	100.0%	122,848
Operating expenses before interest and depreciation	92.9	104,766	90.0	114,805	89.7	110,297
Depreciation	3.9	4,435	5.0	6,357	3.7	4,425
Interest expense	0.6	719	3.5	4,526	0.6	744
Total operating expenses	97.5*	109,920	98.5	125,688	94.0	115,466
Income from operations		$ 2,803		$ 1,873		$ 7,382
Patient Day Data						
Number of patient days of care		142,620		143,380		142,620
Number of patient days in 1983 adjusted for severity index compared to 1982 case mix				146,047		
Cost of care per patient day						
Operating Expenses before interest and depreciation (OEBID)		$ 735		$ 801		$ 773
Case mix adjusted for 1983				$ 786		
Total operating expenses per patient day including depreciation and interest		$ 771		$ 877		$ 810
Case mix adjusted				$ 861		
Income per patient day		$ 19.65		$ 13.06		$ 51.80
Case mix adjusted				$ 12.82		
Net Patient Revenue/Day		$ 780		$ 889		$ 861
Case mix adjusted				$ 873		

* Difference due to rounding of percentages to one decimal.
** Price level adjusted (PLA) to reflect specific price changes from 1982 to 1983. See Appendix for details.

A and B of Table 1 lead to the following conclusions:

1. Total expenses increased by 14.4 percent. This magnitude of annual cost increases is the type that has generated concern about rising hospital costs.
2. About 36 percent of this cost increase was due to added depreci-

ation and financing costs (associated with a major renovation of part of the hospital and for equipping that area). Operating expenses before interest and depreciation (OEBID) actually increased about 9.5 percent. It might appear that the operating margin has improved, since OEBID costs decreased as a percent of net patient revenues from 92.9 percent in 1982 to 90.0 percent in 1983. The financial statements provide no other help in determining whether this improvement is due to higher fees, greater efficiency in managing operating costs, output mix, or one-time aberrations.

3. Gross revenues have grown by 12.2 percent while net patient revenues have increased by 13.2 percent. No data are provided on the extent to which the revenue growth is due to increased volume, more expensive patient diagnoses, or higher fees. The higher growth in net patient revenues is apparently the result of less unreimbursed care and lower bad debt expenses. This is somewhat offset by greater contractual adjustments (the discounts given to health insurers like Medicare, Medicaid, and Blue Cross). These changes suggest a shift in the payor mix of cases at this hospital, which may reflect a change in the case mix as well. For example, fewer Medicare cases could mean that fewer geriatric types of illnesses are being treated.
4. Net income has decreased by about $930,000 and as a percent of net patient revenue primarily due to the cost increases noted above.

Thus, from the financial statement data alone, one can derive an overview of the flow of transactions and estimate the cash flows, but there remain many unanswered questions which make it difficult to assess the relative operating performance over these two years.

Price Level Adjusted Income Statement. One type of information that can promote understanding of cost variations over time is the price level changes that affect the hospital. The 1982 statement, restated to reflect 1983 price levels, is presented in Column C of Table 1. These data provide the following added insights:

1. 1983 OEBID reflect a four percent increase over the price level adjusted 1982 level (versus the 9.5 percent before adjustment for price levels). This may be due to volume, case mix, or increases in the operating cost structure (e.g., inefficiencies or new technology). In comparison with revenue, the price level adjusted OEBID were 89.7 percent in 1982 versus 90 percent in 1983. This suggests that there were no improvements in operating efficiency, as was indicated by the unadjusted 1982 statement, but rather a decline in operating margins and profitability before considering the added depreciation and financing costs.
2. More than 73 percent of the revenue growth was due to a nine percent fee increase from 1982 to 1983. The balance of the increase in patient revenues may be due to volume or changes in the mix of cases, but this key issue cannot be resolved with the financial statement data.

Thus, while price level adjustments refine the assessment of performance, important aspects of this question still remain unanswered.

Case Mix and Volume Data. When comparing two years of hospital operations and any two hospitals, the volume and mix of care provided will naturally differ, as will the cost of providing the different mix and volume of care. To address the impact of volume and mix, the hospital provided two types of data not included in the financial statements:

1. Number of patient days of care (a type of data commonly available but excluded from financial statements).
2. Number of patient days of care provided for each Diagnosis Related Group (DRG). DRGs represent one of a number of ways of segregating patient care into case categories with relatively similar treatment requirements. DRG data are now being generated by hospitals for the first time because, beginning in 1983, the reimbursement for care to the elderly under Medicare is based on a fixed fee for each DRG category rather than the cost of service rendered. While in the future hospitals will record internal data about the number of Medicare patient days of care in each of the approximately 400 DRG categories, they are not required to collect or to provide this information for all patients, and few hospitals at this time have accurate records that would allow comparisons for two or more fiscal years. (See Hornbrook [1982] and Becker and Steinwald [1981] for further information on DRGs and other output measures.)

The DRG data were used to adjust for case mix by applying the relative cost estimated for each DRG based on the New Jersey DRG system to develop a cost index for this hospital for 1982 and 1983. (New Jersey has been using DRGs for several years on an experimental basis and currently has the most complete available data on reimbursement rates for each DRG category.) Within any one hospital, the case mix is not likely to shift dramatically from year to year. For the hospital used in this study, the 1983 case mix was found to be about 1.8 percent more costly, reflecting a more severe case mix. Even this modest change was considered surprisingly large by hospital management and appears to be meaningful in assessing operating performance. Note that for more dissimilar hospitals, the insights available from these data will be more dramatic.

The information about patient care volume and case mix is presented in the lower half of Table 1. Patient days increased from 142,620 in 1982 to 143,380 in 1983. A $106 per day increase is documented, from $771 in 1982 to $877 in 1983. Of this, $40 is due to added depreciation and interest and $39 is due to price level changes. At this point, one might conclude that the net increase in OEBID costs is $27 per day ($106 less added depreciation and interest of $40 and inflation of $39). However, the availability of a case mix measure that allows one to adjust the 1983 volume to make it comparable with 1982 case severity generates a case-mix-adjusted patient volume of 146,047 days. Case mix thus accounts for $16 of the $27 per day increase in operating cost; the balance is likely to reflect pure operating cost increases. This last portion of the cost differential is most controllable by management and is the basis for suggesting that operating costs have actually increased. (This breakdown is summarized in Table 2.)

The key point of this analysis is that on the basis of financial statements alone, one could conclude that cost of

TABLE 2

RECONCILIATION OF COST PER PATIENT DAY—1983 VS. 1982

Total cost per patient day in 1982	$771	100%
Effect of price level changes from 1982 to 1983 on cost per patient day	39	5.1
Total 1982 cost per patient reflecting 1983 price level	$810	105.1
Increase in cost due to added depreciation and interest costs associated with major renovation.	40	5.2
Increase in cost due to change in case mix i.e., more severe set of DRGs	16	2.1
Other causes of cost increases	11	1.4
Total Cost Per Patient Day in 1983	$877	113.8

care increased by about 14 percent; the source and nature of this increase could not be ascertained. Inflation data, output volume, and case mix data are necessary to make it clear that the cost increase is not indicative of a major decline in the operating efficiency, but that only $11 per day—or about 1.4 percent increase over 1982 costs—is unexplainable and may reflect potential cost savings from improved management.

The financial statement analysis problems described here are compounded by other problems encountered in comparing FPs and NPs, as will be illustrated in the following sections.

Part 2: FP vs. NP with Identical Output Mix and in the Same Year.

By analyzing the 1983 financial statement of the NP and its restatement in terms of an FP, one can examine cost variations in a situation in which there are no operating differences due to volume, case mix, location, quality of care, operating methods, and assets in use. However, some differences that would occur in FPs are not completely reflected in the revised financial statement:

1. The FP is assumed to have the same operating costs as the NP except that research expenses and restricted gift and endowment income are eliminated. Some of the operating expenses that remain in the FP may be indirect costs of the research activity, and consequently operating expenses of the FP may be overstated. Offsetting this to an undeterminable extent are certain operating costs in the NP for programs funded with restricted funds that might be eliminated if restricted funding were to become unavailable.
2. The FP may well have made different operating and financing decisions than the NP. For example, FPs can benefit from investment tax credits on equipment and the ability to use building and equipment depreciation expenses to reduce income taxes. This could make purchases of capital equipment more attractive to FPs than use of added labor. There is also the possibility that FPs might accept a lower volume of free care patients, since this depresses earnings.
3. The risk profiles of the FP and NP differ and would affect the borrowing rate. While an attempt to adjust for borrowing costs is reflected in the higher interest attrib-

> uted to the FP, this is not a precisely determined risk adjustment. A differential of three percent (see Appendix C) between tax-free and corporate bond interest was used, but this differential could be much greater; for some hospitals at certain times, it may also be lower.

What conclusions might be revealed by comparing this FP and NP for the same year of operation? The data from Appendix C that are used for this analysis are presented in Table 3. OEBID of the FP are higher, although by less than two percent. This difference primarily reflects the FPs' need to replace donated services and pay property taxes. Even with the addition of the higher FP interest cost, FP total expenses before taxes are only about 1.2 percent above those of the NP. This is also manifest by NP cost per day of $877 versus $887 for the FP. The revenues of the FP are higher due to the Medicare return on investment reimbursement supplement, and not to case mix or a higher fee schedule in the FP.

Nevertheless, the FP may appear to be more profitable and/or efficiently managed to the extent that it has lower operating costs as a percent of net patient revenues (89.1 percent for the FPs vs. 90.0 percent for the NP). The higher FP operating margins are offset by higher interest costs resulting in lower pretax operating income for the NP (1.4 percent of net revenues) than the FP (1.5 percent of net revenues). The FP also appears to charge more for services ($900/day) than the NP ($889/day) even though it earns only about 80 percent of the NP's net income.

In this simple example, *any* differences in the FP and NP performance are completely beyond the control of management and are largely artificial, even though the ratios suggest that such differences exist. While the operating expense differences arising from legal status may be inconsequential in this instance, in other situations they may well be substantial. The interest rate differential and income taxes are potentially significant and clearly warrant more attention. Fair comparison of FPs and NPs requires that data about these differences be available and be considered in the evaluation.

Considering the evidence that FPs have performed well from an investor perspective, the NPs' tax and interest advantages should make them even stronger performers on financial dimensions, other things being equal, based on the illustration in Table 3. In addition, studies that have found NPs to have higher costs and lower fees are likely to understate the magnitude of these performance gaps if the accounting data are not explicitly adjusted for the revenue and expense differences associated with legal status, as noted above.

Part 3: FP vs. NP with Different Case Mix and Volume

The 1983 FP is now compared with the 1982 NP adjusted to 1983 prices to provide a comparison of two hospitals operating in the same year with different (albeit modestly different) output mix. It should be emphasized that any conclusions revealed will tend to understate the types of analytic problems that could occur because it is unlikely that any two hospitals would have a case mix, volume, and payor mix that are so similar. The data are presented in Table 4.

Quality differences would be minimal since no major changes in management or operations occurred over these two years. OEBID compared with net revenue may initially appear to be slightly lower for the FP based on financial

Table 3

Comparison of the NP Restated as an FP for 1983
(Data excerpted from Appendix C)

	NP 1983		*FP 1983 Based on NP 1983*	
	(000's)	*%*	*(000's)*	*%*
Gross Patient Service Revenue	$171,602	134.5	$173,149	134.1
Deductions	44,041		44,041	
Net Patient Revenue	127,561	100.0	129,108	100.0
Operating Expenses before Depreciation and Interest (OEBID)	114,805	90.0	115,010	89.1
Depreciation	6,357	5.0	6,357	4.9
Interest	4,526	3.5	5,883	4.6
Total Operating and Financing Expenses	125,688	98.5	127,250	98.6
Income Before Tax	1,873	1.5	1,858	1.4
Income tax expense	N/A		854	
Investment tax credit			(500)	
Net Income	$ 1,873	1.5	$ 1,504	1.2
Patient Day Data				
OEBID per day	$ 801		$ 802	
Total Operating and Financing Expenses per day	$ 877		$ 887	
Net Patient Revenue per day	$ 889		$ 900	

statement data alone: The FP experienced OEBID equal to 89.1 percent of net patient revenues vs. 89.7 percent for the NP. However, such a conclusion would overlook the volume difference, which indicates that the FP OEBID is $802 per day, 3.7 percent above the NP OEBID of $773 per day. The conclusion is still incomplete; the case mix data indicate that the FP had a more severe case mix, so that its adjusted cost per day is $787, or only 1.8 percent above that of the NP. Note that only a small difference in case mix costliness (1.8 percent) results in overestimating the percent of operating cost per day difference by a factor of two. Most of the studies cited in the literature review may be subject to this type of error. The differences in the FP and NP total cost per day are reconciled in Table 5.

Only $13 per day or 1.5 percent of the cost per day is unexplained and potentially due to less efficient management in the FP. Without the benefit of the case mix and volume data and the ability to segregate known differences in FP operating costs owing to their legal status, one could have concluded that the FP was operating at much higher cost levels, potentially attributable to poor management.

Similarly, the unadjusted revenue per patient day might suggest that the FP is paid $39 more per patient day ($900 for FPs vs. $861 for NPs). However, the

TABLE 4
COMPARISON OF AN FP AND NP WITH DIFFERENT CASE MIX AND VOLUME
(DATA EXCERPTED FROM APPENDIX C)

	NP 1983[1]		*FP 1983*[2]	
	(000's)	*%*	*(000's)*	*%*
Gross Patient Revenue	$166,636	135.6	$173,149	134.1
Deductions				
Contractual Adjustments	33,218		34,970	
Unreimbursed Care	4,391		3,860	
Provision for Uncollectible Accts	6,179		5,211	
	43,718		44,041	
Net Patient Revenue	122,848	100.0	129,108	100.0
Operating Expenses before Interest and Depreciation (OEBID)	110,297	89.7	115,010	89.1
Depreciation	4,425	3.7	6,357	4.1
Interest	744	0.6	5,883	4.6
Total Operating and Financing Expenses	115,466	94.0	127,250	98.6
Income Before Tax	7,382	6.0	1,858	1.4
Income tax expense	N/A		854	
Investment tax credit	N/A		(500)	
Net Income	$ 7,382	6.0	$ 1,504	1.2
Patient Day Data				
OEBID per Patient Day (Unadjusted)	$ 773		$ 802	
(case mix adjusted)			$ 787	
Total Operating and Financing Expenses per patient day (unadjusted)	$ 810		$ 887	
(case mix adjusted)			$ 871	
Net Revenue per patient day (Unadjusted)	$ 861		$ 900	
(case mix adjusted)			$ 884	

[1] Based on price level adjusted 1982 NP statement.
[2] Based on conversion of 1982 NP statement to FP status.

more severe FP case mix accounts for $16 of this difference. The balance of the difference ($23) is due to special Medicare payments to FPs ($11), differences in payor mix ($5), and other unidentified factors. The point is that while the FP does appear to have higher revenues per patient, only $7, or less than one percent of the net revenues, are not attributable to the case mix or the payor mix. (See Table 6.)

Summary

The directions of the conclusions in these comparisons are not likely to be indicative of FPs and NPs generally. Other factors may cause many of the conclusions to go in other directions. For example, FPs are believed to have less severe case mix and more favorable payor mix resulting in a patient population whose care is less costly and

TABLE 5
RECONCILIATION OF THE FP AND NP COST PER DAY
(BASED ON DATA FROM TABLE 4)

FP cost/day	$887	100%
Adjustment to reflect more severe case mix	(16)	1.8
Case mix adjusted cost/day	$871	98.2
Added operating expenses due to FP status	(1)	0.1
Added interest costs due to FP status	(9)	1.0
Added depreciation and interest associated with renovation	(38)	4.3
Unexplained excess of FP over NP costs	(13)	1.5
NP Cost/Day	$810	91.3%

who pay a higher percentage of the gross revenues—that is, contractual adjustments will tend to be smaller. (For example, the Hospital Corporation of America's annual report for 1982 reflects contractual adjustments and provision for doubtful accounts of less than 16 percent of gross revenue, compared with 25 percent for the NP in this study.) The FP salaries and fringes have been found to be higher in some studies, whereas more businesslike management practices in FPs may lead to cost savings. Nevertheless, this analysis makes clear that the conclusions that can be derived from financial statement disclosures alone will be incomplete and/or inaccurate. Financial statements must be expanded to include the kinds of information indicated below if they are to be a useful tool for understanding the nature of rising hospital costs and the impact of FPs on the industry as the basis for developing legislation and corporate policies to contain health care costs.

EXPANDED FINANCIAL STATEMENT DISCLOSURES NEEDED TO COMPARE HOSPITAL PERFORMANCE

The comparative analysis completed in the previous section, along with the review of other studies of FPs vs. NPs, suggests that the following supplements to the financial statements are needed to make them more relevant and meaningful for addressing hospital cost control.[5]

1. *Output Mix Data*: Output volume, case mix data, and payor mix data should be provided in a form that will allow users to adjust revenue and expense data for volume and case mix. Standardized volume and case mix disclosures are needed to understand relative hospital costs. A table of patient days and/or patients treated in each DRG category and the weighted cost level using the dollar weights used in this

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[5] The potential users of hospital financial statements were identified as legislators, health care regulators, insurers, and hospital managers. While publicly traded FPs' financial statements are public information, those of the NPs and nonpublic FPs are not as readily accessible. Legislators and regulators generally can gain access to these statements; e.g., the GAO can request such data for any hospital receiving any Medicare payments. Insurers and hospital administrators may not be able to obtain and therefore use these data in the ways intended in this study. While it is unlikely that privately held FPs can be required to make their statements generally available, it can be argued that the subsidies provided by government should enable any citizen to examine the financial statements of any NP (see, for example, Herzlinger and Sherman [1980]).

TABLE 6

RECONCILIATION OF FP AND NP NET REVENUE PER PATIENT DAY

FP Net Revenue Per Patient Day	900	100.0%
Adjustment to reflect more severe case mix	(16)	1.8
Case mix adjusted net revenues per patient days	884	98.2
Premium paid by Medicare to compensate FPs with a return on investment (not paid to NPs) (see Appendix C, note (a))	(11)	1.2
Difference in payor mix resulting in larger discount from fee schedule in NP ($306.53/day) than in FP ($301.55/day)	(5)	0.6
Other unidentifiable differences	(7)	0.8
NP Net Revenue per Patient	861	95.6%

study, or other acceptable weights that are considered to accurately reflect relative costliness of each DRG, should be adopted. The table should also enable one to apply other sets of weights as required. While DRGs have many well-documented flaws, they are likely to be the most widely available case mix measure and would be the most expedient choice until they are replaced by measures more sensitive to the severity of the case mix. Another table summarizing the standard fees and the actual amounts that are paid by each group of payors would enable a user to evaluate the impact of payor mix on financial performance.

2. *Price Level Data*: Price-level-adjusted financial statement disclosures along the lines of SFAS 33 are needed to distinguish trends in operating costs that are not attributable to the underlying impact of inflation. Specific price level adjustments would be preferable to a general CPI, since in the example, the specific price levels by cost type differed substantially. In addition, current cost data would provide a good basis for adjusting depreciation costs, an adjustment that was not possible but which was acknowledged in this study.
3. *Disclosures of the Impact of Interest Rates, Research, Teaching, Fund Accounting, and Donated Services on NP Operations*: The problems with comparing FP and NP hospitals were *not* primarily due to the existence of fund accounting for NPs. The key unknown issue is the extent to which the donated funds and services result in operating costs that would or would not be incurred if these donations were absent. Management of NPs should be asked to estimate the impact of these donations on operating costs as well as the impact of other programs such as research and teaching. Similarly, the difference in tax-free vs. corporate debt rates and waived property tax should be estimated and disclosed to provide a basis for estimating the interest cost subsidy provided to NPs.
4. *Line of Business Disclosure*: Hospital revenues and operating costs

are currently reported as one line of business. In actuality, multiple activities are encompassed in this one business. Notably, inpatient and outpatient care are not segregated. Corporate segment reporting could be extended to hospitals to require separate reports of relevant segments. The reporting should at least segregate outpatient, teaching, and research activities. The volume and case mix for each line of business should also be provided for reasons discussed in 1, above. Such disclosures would in actuality be much more detailed than corporate line of business data because the latter tend to incorporate a wider group of activities, products, and/or services in each segment category than are proposed here for hospitals.

5. *Management Discussion and Analysis*: The SEC corporate reporting standards require management discussion and analysis to help readers segregate price increases from volume changes, understand changes in operating cost levels, understand the impact of inflation, and assess the organization's short- and long-term liquidity pressures. Similar disclosures are needed for hospitals to make comparisons more meaningful.
6. *Government-Owned Hospital Reporting*: The above recommendations should explicitly extend to government nonprofit hospitals, as this represents an area that could be overlooked as a result of the separation of the responsibility for establishing accounting standards between the Government Accounting Standards Board and the Financial Accounting Standards Board.

The types of disclosures suggested above are largely extensions of reporting standards now required of most large corporations. The one notable exception is disclosure of outpatient volume and mix data. Questions of fairness and cost vs. benefit have been raised about disclosures of this nature. Fairness to the accountor (i.e., the hospital) has been argued by Ijiri [1983] to be a key concern because the disclosure may damage the accountor *vis-a-vis* its competitors. Hospitals have been less vulnerable to this type of damage because of the nature of competition in this industry. Hospitals compete to attract physicians as a means of attracting patients, which has historically meant an absence of price competition. However, the pressure to reduce health care costs has increased the price competition. More complete cost and volume disclosures may result in a net loss of patients and revenues for some hospitals. The issue is whether the public benefit will exceed this cost.

The need for output disclosure is already acknowledged in the accounting literature for nonprofit organizations as reflected in the following excerpts from the Financial Accounting Standards Board's *Statement of Financial Accounting Concepts #4—Objectives of Financial Reporting by Non-Business Organizations (1980).*

> Information about an organization's service efforts and accomplishments is useful to resource providers and others in assessing the performance of a nonbusiness organization and in making resource allocation decisions particularly because: . . . accomplishments . . . generally cannot be measured in terms of sales, profits, or ROI . . . [Paragraph 51]
>
> Financial reporting should provide information about the service efforts of a nonbusiness organization . . . [i.e.,]

> how the organization resources are used in providing different programs or services. [Paragraph 52]
>
> Ideally, financial reporting also should provide information about the service accomplishments . . . in terms of goods or services produced (outputs) and of program results . . . [Paragraph 53]

In the case of hospitals, the volume and mix of outputs are so basic to the operation that excluding these data severely constricts the usefulness of the financial statements in answering questions about relative costs and performance. There are two opposing views about how hospitals should evolve. One view is that NPs should lose their government subsidies and allow lower-cost, more efficient FPs to take over. The other side argues that such subsidies are justified because NPs provide service for a different mix of patients than FPs and that they comprise a different set of institutions that meet a distinct need in our society. At the operating level, a better understanding about whether there are efficiencies in FPs that NPs could benefit from, or vice versa, could lead to improved cost control for all hospitals.

Summary

Currently, hospital financial statements provide no help or potentially misleading conclusions about these issues. The role of the accounting disciplines has historically been one of follower rather than leader in achieving breakthroughs on issues of health care cost management. The expanded financial statement disclosures suggested in this study could help resolve many of the ambiguities about the relative performance of hospitals and move accounting into a leadership role in dealing with the management of health care costs. This study also suggests that there is an important role to be played by the accountant in the continuing efforts of economists, hospital administrators, health care regulators, and legislators to understand the causes of rising health care costs and to identify ways to contain them. While other problems may arise in studying a large group of NP and FP hospital financial statements, these findings provide a strong set of initial hypotheses which can be further tested and expanded upon in future research.

APPENDIX A

Study	Sample Characteristics	Performance Dimension: Quality of Care	Cost per Day	Cost per Admission	Fees Charged for Services	Operating Efficiency
Steinwald & Neuhauser		*FP*=*NP* (Accreditation)				
Ruchlin		*FP*>*NP*.				
Bays	19 FPs and 22 NPs in California. *FP* case mix≠*NP* case mix	*FP*=*NP*. Mortality rates *adjusted for case mix.*		*FP*=*NP*. *FP* chains<Ind. *FPs* & *NPs*		
Clark		*FP*=*NP*. Malpractice claims, high prestige technology, suspect practices.	*NP*<*FP*	*FP*<*NP*		
Berry			*NP*<*FP*			
Lewin, Derzon & Margulies	52 matched pairs (104 hospitals) in California, Texas, and Florida.		*NP*<*FP*	*NP*<*FP* *FP*<*NP* (in Florida)	*NP* (Fees)<*FP* *NP*(Mark-Up)<*FP*	*FP* (Capital and personnel utilization)>*NP*
Sloan and Vraciu	112 hospitals in Florida. *FP* Case mix=*NP* case mix.		*NP*=*FP*. *FP* chains<*NP* and *FP* inds.	*FP* chains<*NP*. *NP*=*FP*	*NP*=*FP* (per admission). *FP* chains< *NP* & *FP* Ind. (per admission)	
Coyne	177 hospitals—distinguished between chain and non-chain and private NP vs. public NP			*FP* and *NP* Ind. <*FP* chains. County owned *NP* chains<*FP* and *NP* Ind.		*FP*=*NP*

APPENDIX A—*Continued*

Pattison & Katz	280 hospitals in California	*NP<FP*	*NP<FP*	*NP<FP*	
Kushman & Nuckton					*FP* (Responsiveness of bed stock to demand.)>*NP*
Wilson & Jadlow	922 hospitals—Nuclear medicine.				*FP* (Nuclear medicine.)>*NP*
Sherman & Chilingerian	733 hospitals				*FP* (Shared services, competitive bidding, pre-admit testing, demand forecasting.)>*NP*

APPENDIX B

FINANCIAL AND OPERATING DIFFERENCES OF NP AND FP HOSPITALS

- FPs have access to equity capital not available to NPs. This also allows FPs to offer employees remuneration in the form of stock options and stock purchase plans that do not drain cash from the organization. This potentially would allow FPs to attract more professional managers capable of running more efficient and profitable hospitals.
- FPs are corporations with shareholders who expect the Board to manage the organization to yield growing profits and cash flows.
- NPs are generally operated to maximize service while maintaining solvency, rather than to generate profits that can be distributed to shareholders.
- NPs are exempt from property and income taxes, resulting in lower operating expenditures.
- NPs can receive tax-deductible donations, a source of capital not available to FPs. Such donations can replace the need to finance equipment purchases with debt, and there is no requirement to repay or provide a return to the donor. (These revenues are restricted funds and are consequently segregated from operating funds in the financial statements.)
- NPs can attract donated services which may replace the need for expenditures on these services. FPs generally do not receive such donated services, or receive them in significantly lower volume.
- NPs can issue tax-exempt debt resulting in lower interest costs than FPs.
- The mix of patient care (case mix) and the mix of payors may differ among FP and NP hospitals. The output mix is a basic issue in comparing costs of any businesses. This has been a key concern in hospitals due to the allegation that FPs seek a select mix of patients and payors to maximize profits. Case mix "cream skimming" implies attracting a mix of illnesses that are particularly profitable due to the cost advantage. This is distinguished from payor mix "cream skimming" where hospitals may attempt to attract patients who will pay the full rates charged by the hospital. Certain payors, such as Medicare, Medicaid, and frequently Blue Cross, pay less than full rates based on contractual agreements while private patients and other private insurers generally pay the full rates billed by a hospital (except, of course, for private patient free care and bad debts). Hence, the payor mix and the patient mix may differ among FP and NP hospitals. Case mix affects the cost of care while case mix and payor mix affect the revenue generated from services provided.

APPENDIX C

STATEMENT OF REVENUES AND EXPENSES

	(I) NP 1982 (000's)	Price Level Adjustment Factor	(II) PLA-NP 1983–82 (000's)	(III) NP 1983 (000's)	NP Converted to FP Adjustments (000's)	(IV) FP 1983 (000's)
Patient Services Revenues						
Room and Care	$ 45,364	9.0%[1]	$ 49,447	$ 52,017	1,547[a]	$ 53,564
Clinics	18,722	9.0%[1]	20,407	19,695		19,695
Special Services	88,433	9.0%[1]	96,391	99,614		99,614
Supplementary Income	378	3.5%[2]	391	276		276
Gross Patient Service Revenues	152,897		166,636	171,602		173,149
Deductions from Patient Services Revenues						
Contractual Adjustments	30,477	9.0%[1]	33,218	34,970		34,970
Unreimbursed Care	4,028	9.0%[1]	4,391	3,860		3,860
Provision for Uncollectible Accounts	5,669	9.0%[1]	6,179	5,211		5,211
	40,174		43,788	44,041		44,041
Net Patient Services Revenue	112,723		122,848	127,561		129,108
Operating Expenses Excluding Research						
Salaries and Wages	50,638	6.0%[3]	53,676	57,526	100[b]	57,626
Fringe Benefits	7,925	6.0%[3]	8,400	8,638	15[c]	8,653
Services of Physician Groups	16,101	6.0%[3]	17,066	17,809		17,809
Supplies and Expenses	30,102	3.5%[2]	31,155	30,832	90[d]	30,922
Operating Expenses Before Depreciation	104,766		110,297	114,805		115,010
Depreciation Expense	4,435	5.0%[4]	4,425	6,357		6,357
Operating Expenses Excluding Research	109,201		114,722	121,162		121,367
Interest Expenses	719	3.5%[2,4]	744	4,526	1,357[e]	5,883
Income before other Revenues and Expenses	2,803		7,382	1,873		1,858
Other Revenues and (Expenses)						
Transfer of revenues for research and specific purposes	8,423	3.5%[2]	8,718	8,780	(8,780)[f]	—
Research Expenses	(9,065)	3.5%[2]	(9,382)	(9,510)	9,510[f]	—
Realized and Unrealized Gains (Losses) on Investments	279	3.5%[2]	289	965		965
Net Investment Income	2,695	3.5%[2]	2,789	2,051		2,051
Unrestricted Gifts and Grants	126	3.5%[2]	131	122	(122)[f]	—
Other	(59)	3.5%[2]	(61)	(433)		(433)
Income Tax (State and Federal)					(1,561)[g]	(1,561)
Net other Revenues and Expenses	2,399		2,483	1,975		1,022
NET INCOME	$ 5,202		$ 9,865	$ 3,848		$ 2,880

APPENDIX C—*Continued*

Adjustments for specific price level effects based on hospital management's assessment of each revenue and expense item's change from 1982 to 1983.

[1] Based on actual fee increase from 1982 to 1983.

[2] Consumer Price Index from Statistical Abstract of U.S., U.S. Department of Commerce, 1984.

[3] Salary inflation rate experienced by hospital.

[4] The construction cost increases from 1982 to 1983 were estimated by management to be five percent. The hospital uses straight-line depreciation. There were no major equipment disposals during 1982 and essentially all assets had the same depreciation charge in 1982 and 1983, except for the renovation that accounted for substantially all of the $1,922,000 increase in 1983 depreciation. No adjustment was needed to price-level-adjust the 1982 depreciation, since the asset base is identical to that of 1983 except for the renovation. The depreciation expense in 1983 would have been lower if the renovation had been completed in 1982. Hence, there remains an overstatement of the true increase in depreciation between 1982 and 1983. Similarly, the 1983 financing costs would have been lower had the renovation been completed in 1982 due to lower construction costs which would have been affected further by the interest rates in effect in 1982.

For purposes of this analysis, it is sufficient to know that 1983 operations reflect use of the same assets as 1982, except for the major renovation. In other hospital comparisons, detailed price-level-adjusted capital costs will be needed to clarify differences in the asset base used by hospitals.

[a] Medicare provides a nine percent return on investment allowance to FPs, which is not provided to NPs, to recognize the FPs' objective of earning an adequate return on shareholder equity. The adjustment that would result was estimated as follows:

Net hospital investment (assets − liabilities)	$61,400,000
Return on investment allowance	9%
	$ 5,526,000
Percent of all patient care days related to Medicare patients	28%
	$ 1,547,000

[b] NP estimated that it had about ten full-time equivalents of personnel valued at $10,000 per year of donated services, that would otherwise have to be purchased. Total donated services substantially exceed this amount.

[c] Fringe benefits related to donated services (item *b*).

[d] Estimated property tax that would be assessed on hospital buildings if it were FP is $90,000.

[e] The differential between the NP tax-exempt interest rate and the FP corporate borrowing rate is assumed to be 300 basis points. The NP's interest rates, which range from 8½ to ten percent, were assumed to be ten percent in calculating the corresponding FP debt rate. Hence, the FP debt interest was calculated to be [(10% − 3%)/10%] × [*NP* interest expense]. The actual spread between tax-exempt and taxable debt interest rates can vary based on the level of interest rates, the percentage of debt financing, other hospital-specific risk factors, and the income tax rates and laws. While the spread of three percent assumed here is reasonable (see, e.g., Slater [1984]), the actual spread may be much higher or lower.

[f] In an FP there would be no restricted and unrestricted gift income to be transferred in to cover research and operating costs. Similarly, there have generally been no research activities at FPs, although this type of activity can be conducted at FPs. No adjustment has been made to estimate any changes in operating expenses that would result if the restricted funds for special purposes were absent. No adjustment was made to reflect any administration overhead costs that might be reduced if the research activities were eliminated.

[g] Income taxes were estimated as follows:

		Income Tax Expense (000's)
Income before tax excluding capital gains on sale of investments ($3,529 − $965).	$3,476	
State tax at 8%	278	$ 278
Income before federal after state tax	3,198	
Federal tax (46%)		1,471
Capital gains on sale of investments	965	
Federal capital gains tax assuming all gains are long-term (28%)		270

Appendix C—*Continued*

State tax on capital gains net of federal tax saved from added state tax deduction (77.1 − 35.0)	42
Income taxes before investment tax credit	2,061
Investment tax credit (10% of $5 million equipment additions)	(500)
Income tax expense	$1,561

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BOOK REVIEWS

Harvey S. Hendrickson, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Richard P. Brief, 520 Tisch Hall, College of Business and Public Administration, New York University, New York, NY 10003.

(The policy of the *Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.)

WAGDY M. ABDALLAH, *Internal Accountability: An International Emphasis* (Ann Arbor: UMI Research Press, 1984, pp. xv, 114, $37.95).

With the development of multinational enterprises (MNEs) came an extension of the accounting function to record and report intracompany operations. Performance evaluation of foreign subsidiaries and their managers is a problem area that has evolved with this extension of the accounting function.

Abdallah's work focuses on the problem of building a performance evaluation model for American MNEs that incorporates certain previously ignored environmental factors. He begins by developing the following general research hypothesis: "There is no association between noncontrollable environmental factors of a particular foreign country and measured performance of a foreign subsidiary in that particular country" (p. 11). He uses noncontrollable to describe those factors that affect business operations of a foreign subsidiary, e.g., sociological, economic, political-legal, and educational. The general research hypothesis then is subdivided into a series of null hypotheses that test for no association between the particular noncontrollable environmental factors and selected variables that have maximum impact on foreign subsidiary operations.

The author used a questionnaire survey to gather the data necessary to test the formulated hypotheses. Of the 178 eligible American MNEs to which the questionnaire was sent, 56 responded, a response rate of 31.5 percent. The questionnaire gathered information on the measures used to evaluate performance and the effect that each environmental variable has on subsidiary performance.

The MNE environmental model developed by Abdallah is a synthesis of the Farmer and Richman model (1980) and a model developed by Kinney (1968). Abdallah's model isolates the effects of noncontrollable environmental factors which then allows for estimating the relative managerial performance among a group of foreign subsidiary managers. The model used 16 noncontrollable environmental factors as continuous independent variables, ten industries as categorical independent variables, and 14 countries and country groups as categorical independent variables. Abdallah involves five parts in the structure of his MNE environmental model: (1) the general MNE environmental model, (2) an MNE environmental model of different industries, (3) an MNE environmental model of foreign countries, (4) an explanation of the impact of environmental factors on measured performance, and (5) the estimation of the managerial contribution as a controllable factor by the foreign subsidiary manager.

Using step-wise multiple regression and correlation, Abdallah found that the environmental factors, taken by themselves, are not meaningful unless they are interpreted relative to specific countries, or industries, or both. When looking at particular industries operating in particular countries, the environmental variables significantly affect the measured performance of foreign subsidiaries. The effect of sociological variables on MNE operations is more significant than the effect of the other environmental variables, with economic second, legal-political third, and educational last.

Abdallah's book provides a good review of previous studies on MNE performance evaluation systems. The previous studies have suggested the need for development of a model that would incorporate environmental factors into the performance evaluation process. Abdallah has actually made such an attempt and is to be commended for it. His work is good and can be used as supplemental reading for graduate level accounting and administrative control courses. In addition, this book is of interest to the practitioner as it provides a real step forward in solving the dilemma of developing a valid MNE performance evaluation model.

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Jean-Loup Ardoin, Daniel Michel, and Jean Schmidt, *Le Contrôle de Gestion* (Paris: Publi-Union, 1985, pp. 448, FF340,000 paper, available only in French).

This is another entry in the short list of textbooks covering management control systems whether in English or French. The stated objective is to fill a gap existing between the "how to control" books and the technical cost accounting texts. A distinguishing feature is the equal treatment of the design of a management control system and its implementation.

The first part, entitled "To Know," includes six chapters covering (1) an introduction to management control, (2) fitting management control to the structure of the organization, (3) planning and budgeting, (4) computing and reporting of variances, (5) capital budgeting, and (6) transfer pricing. These chapters present conventional treatments of management control tools (e.g., planning, budgeting, standards, variances, and transfer pricing). They can be improved and would be more exhaustive with the addition of production, marketing, and sales variances; cost-investigation models; control techniques in not-for-profit organizations; control techniques for multinational operations; and control for complex programs.

The second part, entitled "To Know How," includes four chapters covering (1) the organization of the controller's department, (2) the implementation of a management control system, (3) the example of a "diagnosis" of a management control system, and (4) the fitting of management control to specific functions. These chapters present a contingency model of the design and implementation of a management control system. The model includes three phases: a need analysis consisting of diagnoses of the environment, the economic position of the firm, its structure, and its managerial decision process; an evaluation of the present managerial control system in terms of the needs of the firm; and conceptualization and implementation of a plan of action for the implementation of a better management control system. An exhaustive example of the implementation of the contingency model in a known French firm provides a step-by-step application of the model. This clearly presents one of the few examples of the practical applications of the contingency model in the design and implementation of a managerial control model. It constitutes the major strength of the book compared to other management control texts, which lack such an exhaustive and comprehensive analysis.

The third part, "Perspective and Development," includes a single chapter covering the future role of the controller.

This book represents a valuable addition to the "control" literature. It should be useful for readers of French as a supplement in undergraduate and graduate controls systems courses and as professional reading to those who have an interest in management control in general and practical applications of the contingency control models in particular.

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Michael J. Barrett, Gerald W. Lee, S. Paul Roy, and Leticia Verastegui, *A Common Body of Professional Knowledge for Internal Auditors: A Research Study* (Altamonte Springs: The Institute of Internal Auditors Research Foundation, 1985, pp. xxi, 123, $25.00 paper).

This book reports on the results of a research study commissioned by the Institute of Internal Auditors. As the title implies, the objective was to determine a common body of professional knowledge for internal auditors. The study examined the knowledge of relevant disciplines, the skill in performing internal auditing tasks, and the experience necessary to be a qualified and competent internal auditor. Consideration was given to the skills needed for both entry-level and senior-level positions. This publication is intended primarily to assist and guide developers and teachers of certificate, degree, and/or continuing education programs and courses for internal auditors

The study found that the economic sector or industry in which an auditor worked played a significant part in the level of skill or knowledge needed. For example, auditors in the financial services industry do not need to have as much knowledge as those in governmental/nonprofit or manufacturing industries. Also, financial services industry auditors do not require knowledge in the same disciplines as those in other industries.

Another finding was the allocation of time between financial auditing and other operational or systems audit tasks. The current study found that less than one-third of an internal auditor's time was spent on financial auditing. This has implications for auditing professors since most auditing courses are devoted largely to financial auditing.

Of particular interest to academicians is Chapter 4 which discusses the skills needed by entry-level personnel. Those needed most include auditing, computers, accounting, and communications. Of far less importance are MBA-type areas such as finance, management, statistics, and marketing. Many academicians may question the minor role given to statistics, but the authors explained that internal auditors rarely use statistical sampling despite the attention given the subject by professors. The heavy emphasis on accounting-related topics is an indication that the modern internal auditor must be an accounting graduate and not the general-business-MBA type that often was hired for the audit staff in earlier years.

Academicians and developers of continuing education programs should examine this study before implementing an internal auditing course or curriculum. The authors also suggest that their study has implications involving a need for a change in the IIA standards and in the content of the CIA examination.

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AHMED BELKAOUI, *International Accounting: Issues and Solutions* (Westport, CT: Quorum Books, 1985, pp. xiv, 364, $39.95).

This book adds to the substantial number of new texts in this area in the last five years. Three chapters are of an overview nature, two concern translation and inflation accounting, five are on multinational (MNC) management, and one is on economic development. This book has less of a bias toward comparative financial reporting than many do. Its scope seems quite supportable and the ordering of issues is sensible. Its omission of assignment material may prove a drawback compared to some competitor texts.

I have three categories of concern with the content. The first is the frequent lack of clarity of ideas. This begins in Chapter 1 with an inconclusive discussion of the nature of international accounting. Is it an academic subject or a set of practical problems for MNCs? This inconclusiveness makes it difficult to understand discussions of "the growth of international accounting" (p. 5) or "international accounting theory" (Chapter 3).

The book also reports on pressures to harmonize accounting standards for MNCs (Chapter 3). But one of the reasons given appears contrary: "Investment institutions differ from country to country, thus causing differing information wants and usage" (p. 18). Then, in the chapter on the causes of national differences, three pages are devoted to accounting as a language, but no connection is established with the chapter's topic. Taxation is seen as a cause of differences, but the example given (VAT) seems quite irrelevant as an explanatory factor between U.S. and U.K. (or other EEC) accounting: financial reports in both countries show sales net of sales taxes.

The second concern is that the book has many misleading or incorrect statements. For example, we are told that Belgium has virtually no audit requirements (whereas quoted companies have needed auditors since 1953, and now all but small companies need them), and that statutory audit is compulsory for all French companies (whereas it does not apply to the very large number of smaller private companies). It is said (p. 20) that Whinney Murray Ernst and Ernst is the international arm of the U.S. firm Ernst & Whinney (whereas the latter international name is a replacement for the former international name). Also (p. 20) "European firms" are said to include both KMG *and* "McLintoech Main La Frentz" (whereas the latter has two spelling mistakes and was subsumed within KMG when it was formed).

Later, we are told that the current rate method of translation was "first introduced and supported by the Institute of Chartered Accountants in England and Wales" (ICAEW) in 1968 (p. 94). This is misleading, as the method was predominant in the U.K. for decades before that and can be traced back to the nineteenth century. We also are told that only Greece does not levy corporate tax on distributed profits, whereas the national corporation taxes of both Italy and West Germany are full imputation systems.

The treatment of the EEC is odd. On page 14 it is implied that the U.K., Belgium, the Netherlands, France, and Germany are the members. In Chapter 3, we are told that the membership is ten (p. 67), although the exhibits show nine (p. 70), and we are not told of the well-known increase in membership to 12 at the beginning of 1986. The EEC Directives are discussed without mention that they have to be implemented by national laws; the brief discussion of the fourth Directive gives no clue about its momentous changes to accounting in the U.K., Ireland, and the Netherlands (e.g., compulsory standardized formats) or in other EEC countries (e.g., more disclosure, and overriding "true and fair view").

The third concern is perhaps the most fundamental: the book frequently describes subjects as if constructing a list, thereby ignoring the possibility of comparative analysis. For example, the discussion of currency translation goes country by country using different terminologies. The main comparative point is omitted: that the rules in the U.K. and the U.S. are now nearly identical. Then, the chapter on inflation accounting has no mention of the vital SEC interference in the U.S., nor of the central fact that the U.K.'s Sandilands Committee was government appointed. This leads to the omission of the most important comparative point: from the 1960s to the present, developments throughout the English-speaking world have followed the same pattern at the same times.

This problem, coupled with the fact that the early chapters only have sparse and unconnected facts on accounting in different countries, means that no coherent or accurate impression is given of financial reporting in any country. My view is that a student will float meaninglessly above a subject if discussions of "international accounting theory," the causes of international differences, or the classification of countries do not have an accurate and detailed description and analysis of major financial reporting differences between at least some countries. What is the point of knowing whether, for example, France is in the same group as Germany or whether harmonization is a good idea, if one knows nothing systematic about accounting in either country?

I fear that all the above criticisms are related to this last problem. Writers on international accounting seem to feel that students do not need a firm and detailed grasp of how accounting and its institutions work in several countries. This leads to the vagueness, inaccuracy, and lack of real comparative analysis. Another symptom of the problem is that, for example, of the 41 notes and references at the end of Chapter 1, only one was not a North American publication. As a result, important work is not discussed or referenced even if it is published in English but not in North America. This seems unwise in any field of accounting, but particularly in "international accounting."

In summary, although this book has some weak aspects, it is by no means unique in these failings. Nevertheless, students may find some topics clearly covered, particularly in the second (management) half of the book.

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THOMAS J. BURNS and HARVEY S. HENDRICKSON, Editors, *The Accounting Sampler*, Fourth Edition (New York: McGraw-Hill Book Co., 1986, pp. xxxv, 647, $10.95 paper).

Realization of the importance of literacy in accounting often comes much too late in one's career. This book of readings can offer students this realization of the importance of literacy. A plan for usage should be established by the adopting school for accounting students from the elementary course through the senior year courses, as well as for MBA students. Without a plan, the adopting school will lose the tremendous opportunities of broadening the scope of accounting and of stressing the pay-offs of being literate in accounting.

The editors recognize that their book is not just for elementary accounting students, although they limit their usage plan primarily to them. The reviewer ranked the 163 readings as to applicability for sophomore, junior, senior, and MBA students; as to content; and as to overall value. A one-to-five scale was used with one being very limited; two, somewhat limited; three, good; four, very good; and five, excellent.

TABLE 1
RANKINGS BY REVIEWER

	1	*2*	*3*	*4*	*5*
Sophomores	41	67	36	14	5
Juniors	13	44	49	42	15
Seniors	11	34	38	67	13
MBA's	12	38	34	49	30
Content	14	19	32	57	41
Overall	14	28	36	45	40

The readings are inclusive of the English literature in accounting, and are up-to-date. But consistency is lacking in the questions and the bibliography after each reading, and the editors provide few comments. Again, a carefully thought-out plan can present additional input on these matters. I would have pruned the "uplift" type of readings, but had a great deal of enjoyment from the entire collection and learned a considerable amount. The five best selections, in my opinion, were Ijiri's "The Maturing Process of Accounting Students . . ."; Davidson, Moonitz, and Nelson's "Tax Allocation: A Debate"; Frost's "The Hardship of Accounting"; Ginsburg's "Negotiating Budgets: Games People Play"; and Medawar's "What is Accountability?"

The fourth edition, like the third (reviewed October 1977, p. 993), has about 90 percent new inclusions. The previous review commented on the financial accounting emphasis of the readings. The fourth edition contains a better balance with coverage of financial, managerial, governmental, and international accounting, and planned economies. While the previous reviewer felt the third edition of 595 pages was too short, I find that the fourth edition is too long. But it is far better to be too long than too short in this effort. The editors are to be complimented for their massive efforts and good work.

This book of readings, together with a carefully thought-out plan of usage, offers a very good opportunity for students to learn about accounting's broad scope and to gain some literacy in it. This book could serve accounting students over their entire undergraduate careers; its current price makes it very affordable. The adopters who prepare the plan of usage will greatly benefit not only their students but also themselves.

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J. OWEN CHERRINGTON, E. DEE HUBBARD, and DAVID H. LUTHY, *Cost and Managerial Accounting* (Dubuque, IA: Wm. C. Brown Publishers, 1985, pp. xxi, 884, $33.50).

The stated approach of this textbook is to balance a managerial, product costing, and quantitative orientation to cost accounting. The book contains topics commonly found in a typical cost accounting book. Each of the 24 chapters starts with an introductory paragraph clearly stating the chapter's objectives and ends with a summary concisely highlighting the important points presented. The end-of-chapter materials include suggested readings, discussion questions, exercises, and problems.

The book is accompanied by a solutions manual, instructor's manual, student workbook, and a set of transparencies for selected exercises and problems. Each chapter of the instructor's manual contains an instructor's outline, test bank, and test bank solutions. The manual also contains 101 pages of lecture material in a form suitable for making transparencies for classroom use.

The strengths of this book are its readability, flexibility, and abundance of end-of-chapter materials. Short sentences make the book highly readable. An extensive use of graphs, figures, and exhibits further enhances its clarity. The presentation of the relationships of overhead variance analysis methods (2-, 3-, and 4-way analysis in Chapter 16) exemplifies the success of such use. In general, concepts and terms relevant to each chapter are explained clearly before any additional material is presented. Most chapters are self-contained and do not refer to materials given elsewhere. Thus, instructors desiring a sequencing of topics that is different from the book should experience minimal difficulty. Appendices at the end of certain chapters give instructors additional flexibility in selecting topics to be included in a course. Finally, sufficient end-of-chapter materials make it easy to select desirable assignments.

The book, however, has several weaknesses. First, the level of difficulty seems to vary from chapter to chapter. Particularly noticeable is the fairly complex presentation of "additional features" of process costing (Chapter 10), followed by a chapter with relatively easy exercises and problems. Second, the book contains some conceptual and printing errors. For example, charging marketing and administrative expenses to by-product inventory (p. 358) should not be acceptable in theory or practice. The heading of the first table in Problem 8.7 (p. 271), titled "Direct Overhead Total Work In," obviously is a misprint. Third, some chapters need a variety of more challenging exercises and problems. As an example, almost all assignments on variable costing vs. absorption costing require computation and reconciliation of net income under the two alternatives. Very few, if any, require consideration of the managerial/behavioral implications of either costing approach for internal reporting. Another weakness relates to the attempt to make each chapter self-contained. The repetition of some topics causes unneeded redundance as well as confusion. For instance, disposition of variances is discussed in two consecutive chapters (15 and 16). Material price variances are prorated differently in the illustrations, with no explanation of the difference. The instructor should be prepared to explain that the difference occurs because of the timing of the variance computation. Additional (minor) weaknesses include the use of confusing terminology as well as errors (or lack of consistency with the book) in the solutions manual. For example, "standard activity level" is used in place of "denominator activity level"—a term commonly found in competing books. In the solutions manual, "normal loss" is used when "normal spoilage" should be.

Overall, the book appears to be well-written and is suitable for an undergraduate cost accounting course. It also may be used for an introductory managerial/cost course in an MBA program. But it does not seem to contain sufficient material for an in-depth coverage of managerial and quantitative topics at schools having a two-course sequence in cost/management accounting. This book may evolve into a major contender in the cost/management accounting arena if the weaknesses are eliminated in future editions.

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SIDNEY DAVIDSON, MICHAEL W. MAHER, CLYDE P. STICKNEY, and ROMAN L. WEIL, *Managerial Accounting: An Introduction to Concepts, Methods, and Uses*, Second Edition (Chicago: The Dryden Press, 1985, pp. xxiii, 968, $35.95).

This second edition represents a major expansion and reorganization of the first (reviewed January 1979, p. 247) while retaining a strong decision-making orientation. The authorship has changed, with M. W. Maher replacing the late J. S. Schindler. The text combines a discussion of product costing that is more comprehensive than most management accounting texts with a strong treatment of decision making, budgeting, and performance evaluation. It is up-to-date and has a broad range of well-written problems. It is a fairly rigorous text that probably would fit best in an MBA curriculum, but would offer a challenge for undergraduates.

The text is now divided into five sections: introduction, cost methods and systems, managerial decision making, managerial planning and performance evaluation, and special topics. The introductory section provides an adequate background to reorder the subsequent sections, but the cost of the flexibility is some duplication between the introduction and the section on managerial decision making.

The section on cost methods and systems is substantially expanded and now explains product costing in terms of a 3 × 2 matrix of actual, normal, and standard costing on one dimension, and variable and absorption costing on the other. Both managerial implications and bookkeeping examples are presented. Process and job order costing are added to the matrix as a third dimension and simple illustrations of the bookkeeping involved are provided.

The section on managerial decision making also is expanded. The discussions of cost/volume/profit analysis and capital budgeting have both been expanded and reorganized. The section on managerial planning and performance evaluation also has been expanded and the section on budgeting has been reorganized. As in the previous edition, the discussion of behavioral aspects is limited, but adequate. The final section includes a chapter on cost allocation and a new synthesis chapter that ties together topics from managerial and financial accounting (an innovative and useful addition). Chapters on financial accounting and financial statement analysis also are included in the final section.

The problems may be the best part of this text. Their broad range allows assignments to be challenging or straight-forward. The instructor's manual, study guide, solutions manual, and transparencies are competently done and complete.

In summary, this edition represents a major improvement in a text that already was good. It is challenging and up-to-date in its approach and methods. The focus is more economics/finance than behavioral science, but the cases allow for discussion of behavioral implications. This good book now is better.

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DONALD H. DRURY and VIHANG R. ERRUNZA, *Managing Foreign Exchange Exposure* (Hamilton, Ont.: The Society of Management Accountants of Canada, 1985, pp. viii, 130, Can. $15.00).

Most of the empirical work that has been published in the area of foreign exchange exposure has dealt with practices of U.S.-based multinationals. For this study, Drury and Errunza surveyed the 325 Canadian companies that the Canadian Institute of Chartered Accountants uses in the preparation of its annual publication, *Financial Reporting in Canada*. The data set resulted from usable responses from 58 companies.

The questionnaire explored the following issues: foreign exchange risk exposure (transactions, translation, and economic), management and responsibility for foreign exposure, management techniques used to reduce foreign exchange exposure, methods used to forecast exchange rates, and special issues dealing with the translation of foreign currency financial statements. The authors discuss each of these issues, then use appendices for presenting the cover letter, follow-up letter, questionnaire, a list of the companies surveyed, and a glossary of foreign exchange management terms.

Each chapter has a brief discussion of conceptual issues that relate to the topics covered. Some chapters clearly are stronger than others in this, but all of them provide some useful information to readers who may not be well versed in the issues. Then the authors present and briefly discuss data from the questionnaire. In most of the chapters, the authors compare their results with other studies on foreign exchange management, especially the Evans, Folks, and Jilling study conducted for the FASB in 1978. Drury and Errunza apparently used that study as an important foundation for identifying the issues that they investigated.

The book is primarily descriptive rather than normative.The authors do not attempt to mix theory with practice to recommend what Canadian companies should do. Instead, their objective is to provide data on corporate practices in Canada. Their book is an important addition to the empirical literature, because it provides some useful information in the Canadian context. The information was gathered before companies had adopted the new standard for translating foreign currency financial statements (similar to SFAS 52 in the United States), so it is difficult to know if corporate practice is the same today. But the data are interesting and useful.

The book is a good reference book for academics and also could be used as a supplement in courses that deal with foreign exchange management. It would not be suitable as a stand-alone textbook.

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Lester E. Heitger and Serge Matulich, *Cost Accounting* (New York: McGraw-Hill Book Co., 1985, pp. xxi, 962, $33.95).

The authors state that their new cost accounting text "was written to satisfy the needs of accounting majors and nonaccounting students who desire a strong background in cost accounting concepts and procedures and in the managerial reporting process" (p. xvii). This goal is only partially fulfilled because supplementary materials would be needed with this text for a course that is to have in-depth coverage of cost accounting topics.

The text comes with several teaching aids—a solutions manual, an instructor's resource manual, exam questions, and transparencies. The instructor's resource manual contains detailed information about the problems and exercises in the text. The solutions manual has answers to all the assignment material; unfortunately, it contains a number of mistakes. The transparencies were sent to this reviewer with no backing sheets of paper; this makes them difficult to handle and use. Also, associated with this text is a job-order costing practice set (The Omni Manufacturing Co.) for the IBM PC and microcomputers that are strictly compatible; this practice set will not work on some IBM compatibles such as the Zenith and the Eagle.

The style of writing is good and the organization is flexible and logical. The diagrams, charts, and tables are easy to follow. The authors use many examples and problems that are realistic. The problems range from trivial to the more difficult CPA/CMA type questions. What the authors call cases generally are what other authors use as regular problems.

The job-order costing and process costing methods are covered with a variety of segmented examples and problems. A supplement will be needed to illustrate the complete flow of costs in these costing methods together with supporting journal entries.

In the coverage of standard costing, variances are computed by both formulas and the benchmark format approach. A discussion of standard process costing is started in Chapter 8 and then quickly dropped. A supplement would be needed to show the role of equivalent units and the associated journal entries. The proration of variances is briefly mentioned, but not developed, so supplementary materials would be needed to cover this topic. Also, the coverage of standard costing does not include the realistic situation in which the firm has beginning inventories and the resulting complications.

The so-called "in-depth cost accounting topics" in Chapters 18 and 19 are easy and wordy. The coverage of accounting for manufacturing overhead contains some realistic examples, but the attention given to service department cost allocation methods is shallow; the step-down method is ignored completely and the reciprocal method is relegated to an appendix and illustrated with a trivial example.

The authors occasionally use their own terminology without mentioning the term(s) that may be more commonly used. For example, in the case where joint products have no market value at split-off and the joint cost allocation basis is further processing sales price less separable costs, the authors call the allocation method "Estimated Value at Split-off," while most other authors call this the "Net Realizable Value Method."

In the discussion of mix, yield, and contribution margin variances, the authors use complex and wordy formulas (some of which are wrong) for computing variances. Since the authors introduced the benchmark format approach in the standard costing chapters, one wonders why they didn't use it here to avoid their complicated formulas.

The "Tools for Managerial Analysis" section of the text would be more appropriate for a management science textbook. Several of the examples and assignment exercises and problems have little or nothing to do with accounting. In the regression analysis chapter, the use of the standard error of the estimate to develop a range for the dependent variable is incorrect (p. 838).

This is an average text that is easy to read and has many realistic examples. It can best be used in a class where the teacher does not require in-depth coverage of cost accounting topics.

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JACK E. KIGER, STEPHEN E. LOEB, and GORDON S. MAY, *Accounting Principles* (New York: Random House, 1984, pp. xxv, 994, $30.00).

This is a comprehensive accounting principles text. Twenty of the 28 chapters deal with financial accounting topics, seven deal with cost and managerial subjects, and one deals with taxes.

The first 13 chapters use a single-owner business. Three of these (Chapters 2–4) provide coverage of the accounting cycle. A special feature is the introduction of internal control in Chapter 7 and the discussion of its relationship to specific assets and liabilities in subsequent chapters.

Chapter 14 introduces accounting for partnerships, and Chapters 15–18 introduce corporation accounting including consolidation. The remaining financial accounting chapters cover the statement of changes in financial position, cash flow, and financial statement analysis. The seven cost and managerial chapters cover responsibility accounting and branch accounting, manufacturing operations, job cost and process cost systems, cost-volume-profit analysis, budgeting and standard costing, managerial decision making, and capital budgeting. The tax chapter is comprehensive for this level.

In general, the chapters on cost and managerial accounting are presented in a simpler manner than those on other topics. For example, the cost of production report for process cost accounting (Chapter 23) is presented using the average costing approach.

At the end of each chapter is a listing that gives students a brief review of key points that were covered. Many chapters also include one or two demonstration problems with the solutions. These problems help the student to learn the problem material and are a strong feature of this text.

Each chapter has an adequate number of well-correlated questions, exercises, and problems. The variety of exercises and problems allows the instructor to select from the simple to the more complex. Most chapters also include a problem that requires the student to make a business decision.

Substantial supplementary material is available, for both students and the instructor. The material for the student includes a student mastery guide, computer-assisted practice set, two manual practice sets, and working papers. The material for the instructor includes an instructor's resource manual, solutions manual, transparencies, and a test bank that is available in computerized form.

Two objectives of the book are accomplished very well. One was to enhance student awareness of the business environment. This is accomplished by using extensive actual business examples. The actual business examples are used in the text and in the assignment material. Another objective was to pay careful attention to vocabulary building. This is accomplished by having two glossaries. One is dispersed throughout the text and the other is an extensive one at the end of the book.

Side-by-side journal entries for the debtor and creditor are used in Chapter 8 to illustrate the discussion of accounting for notes receivable and notes payable, and in Chapter 17 to illustrate the discussion of accounting for the issuance and investment in bonds. Some instructors may not feel comfortable teaching these topics in this manner.

Income taxes are discussed only briefly prior to Chapter 28, which covers taxation of individuals, taxation of corporations, interperiod income tax allocation, and tax planning. The authors' opinion is that this is "the point at which students are best equipped to understand the discussion" (p. vi). This presentation will cause problems for instructors who do not find time to cover Chapter 28, but would like some coverage of topics such as income tax expense and tax allocation with other topics.

Parts of the book are conceptual; for example, the coverage of qualitative characteristics of accounting information and the quantitative constraints on accounting information (Chapter 13).

In some areas more coverage is given to minor topics than will be appreciated by some instructors; an example of this is the 13 pages devoted to payroll accounting (Chapter 12). In other areas more coverage should be considered. For example, the coverage of present and future value concepts (Appendix to Chapter 17) could be expanded; this in turn could be used to improve the coverage of capital budgeting (Chapter 27).

In summary, the text generally is well written, and would be suitable for the standard undergraduate course in accounting principles.

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A. LAWRENCE KOLBE and JAMES A. READ, JR., with GEORGE R. HALL, *The Cost of Capital: Estimating the Rate of Return for Public Utilities* (Cambridge, MA: The MIT Press, 1984, pp. ix, 183, $25.00).

In no section of the economy is accounting of more importance than in those portions of the public utility industries in which rates are regulated by governmental agencies. The courts have determined that the price of services provided by regulated utilities should be set so that the utility can recover the cost of providing the services, plus a fair return on the fair value of the property. The costs are obtained from the accounting records. In most jurisdictions, the fair value of the property is determined by its historical cost. Only the determination of what is a fair rate of return falls outside of accounting, narrowly defined.

This book explores the question of how the fair rate of return should be determined. It is the outgrowth of a report made to the California Public Utilities Commission, the senior author of which was Professor Stewart Myers of MIT. The book is designed primarily for persons involved in the rate setting process (commissioners, staff, and witnesses) and students of regulation.

As a first step, the authors demonstrate that the allowed rate of return to the common stockholder should be the cost of the utility's common stock capital. The remainder of the book is devoted to the problem of measuring the cost of capital obtained from this source. The various methods in use are tested as to whether they are internally consistent, consistent with economic theory, require data that are readily available and are objective, and whether in practice they yield results that appear to be reasonable.

The two methods that rank highest are discounted cash flow (the cost of capital is a function of today's price of the common stock, next year's expected dividend and the expected growth rate of the dividend—the classic Gordon-Shapiro model) and the capital asset pricing model (the cost of capital is a function of the current risk-free rate of return, the expected rate of return on assets in general, and a measure of risk).

The authors report on the controversy in the finance literature about the theoretical soundness of the models and the measurement of the variables involved. On these matters the typical accountant wisely keeps out of the fray.

Also widely used is the comparable earnings method. This involves the use of data from nonregulated firms operating under comparable risk conditions. The average ratio of net earnings (less preferred stock dividends) to the common stockholders' equity of the companies in the sample then is used as the cost of capital.

The author's discussion of this method displays a good knowledge of accounting. The accountant's measurement of assets at historical cost has no economic justification, the calculation of depreciation is essentially an arbitrary procedure, some accounting principles make no economic sense at all (the treatment of research and development, for example), and the ability of management to select accounting principles from those generally accepted are pointed out as weaknesses of this approach.

When they discuss the weaknesses of accounting data during inflationary conditions, the authors are on weaker ground. They refer to "true earnings," but give little recognition to the controversy in the economics and accounting literature as to what is meant by "true earnings" and as to whether anything like "true earnings" actually exists—or if it does, whether it can be measured.

Less widely used methods such as a subjective allowance for risk and the setting of rates so that market value is equal to book value also are evaluated.

The book contains an excellent bibliography of the literature on the cost of capital and rate regulation.

Who would profit from reading this work? A person interested only in accounting narrowly defined would find little of interest. One who is interested in exploring the cost of capital concept would be better served by reading a sound business finance text. However, accountants are beginning to spread their wings. Some of the national public accounting firms are beginning to market their services to utility commissions and utility companies, claiming expertise in rate regulation matters. Some accountants not so affiliated are doing the same. These persons would be well served by a rigorous study of the book. It fills a gap in the literature.

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EDWARD S. LYNN and JOAN W. NORVELLE, *Introduction to Fund Accounting*, Second Edition (Reston: Reston Publishing Co., Inc., 1984, pp. viii, 134, $19.95 paper).

This paperback is intended primarily to give public administration and other nonbusiness majors and practitioners the basic information they need to understand fund accounting principles and concepts as they apply to the general fund of a governmental unit. Users of the book are not required to possess prior knowledge of accounting principles or fund accounting because the essentials of the double-entry fund accounting model are covered using governmental accounting examples and terminology. (The first edition of this book, published in 1974 and reviewed October 1975, p. 935, was not available and thus was not considered in preparing this review.)

The book is well organized and written in a concise and understandable manner. Its seven chapters contain excellent illustrations and examples of the text material, along with an ample supply of questions and problems. But users will have difficulty comprehending several terms and concepts unless they receive supplementary explanations from another reference source. Several of these terms and concepts (i.e., accrual and modified accrual bases of accounting, interfund transfers, due from/due to other funds, and purchases and consumption methods of inventory accounting) are introduced to the reader prior to, or in a few cases without, a discussion or explanation of their meaning.

The first two chapters introduce the environment and characteristics of not-for-profit organizations and all but four of the 12 fund accounting and reporting principles contained in National Council on Governmental Accounting (NCGA) *Statement No. 1*. The principles related to the accounting for fixed assets and long-term liabilities, the valuation and depreciation of fixed assets, and interim and annual financial reports are excluded from Chapter 2. Because the major emphasis is on the accounting and reporting for the general fund and because these four principles relate to the general fund, they could appropriately have been discussed, at least briefly, along with the other eight.

Chapters 3 and 4 introduce readers to the double-entry accounting model as it applies to fund accounting and the accounting cycle. Within these two chapters, Lynn and Norvelle discuss in a concise, systematic, and effective manner the entity concept, the accounting equation, journalizing and posting, the trial balance, closing entries, and the post-closing trial balance. Chapter examples and illustrations easily take the reader step-by-step through the accounting equation and cycle in a simplified and easy to understand style. The authors achieve this simplicity by limiting the number of accounts used in their examples and illustrations. But such a degree of simplification does raise the question of how well students make the transition from this book to a standard fund accounting textbook. The authors note in the preface that they facilitate this by gradually intermixing assignments from *Introduction to Fund Accounting* with the general fund chapters of a standard fund accounting textbook.

More advanced governmental accounting concepts, including budgetary entries, property tax accounting, encumbrance accounting, and interfund transactions, are discussed in Chapter 5. These subjects are treated in the same concise, simplified, and understandable style that is present throughout the book. But users of the book probably will have a rather difficult time grasping the concepts underlying interfund transactions without a significant amount of assistance from another reference source. While the topic of interfund transactions is beneficial and necessary to an overall knowledge of governmental accounting and reporting, it is considered difficult by many accounting majors.

Subsidiary revenue and expenditure ledgers and accounting for purchases of materials and supplies are discussed in Chapter 6, and examples of the use of the subsidiary ledgers are given. The book concludes with a chapter on the preparation of interim and annual financial statements for the general fund. This chapter would appear to be a good place to briefly introduce the financial reporting concepts underlying comprehensive annual financial reports and general purpose financial statements.

Lynn and Norvelle more than adequately meet their objective of introducing public administration and other nonaccounting majors and practitioners to the rudiments of fund accounting for governmental units. In addition to their concise, systematic, and effective presentations of the subjects covered in the book, their numerous examples and illustrations are well developed and easy to follow. A comprehensive knowledge of fund accounting for governmental units cannot be achieved without a thorough study of accounting principles. However, curriculum constraints faced by nonbusiness majors and financial and faculty resource pressures encountered by accounting faculties may prohibit interested nonbusiness students from obtaining the pedagogically desirable level of accounting knowledge prior to their enrollment in a traditional fund accounting course. While users may find the pace demanding and the transition to a standard fund accounting textbook challenging, they should be able to successfully use the book to achieve its objective.

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JAMES A. O'BRIEN, *Computers in Business Management: An Introduction*, Fourth Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xxiii, 884, $28.95).

From my file of Accounting Information Systems (AIS) course syllabi, I can point to a vast spectrum of concepts that are taught under the rubric of AIS. This runs the gamut from the theory of information to learning how to do spreadsheet budgeting on a personal computer. Selecting an AIS text is part of a much more global task of developing a focus for an AIS course.

Generally, accounting students take some type of introductory computer course before the AIS course. The content of this introductory course and the type of exposure students get (or can get) to the use of computers from other courses are obviously important considerations in setting up the AIS course. At our university the AIS course is a fifth-year elective for professional accounting students working for a master's degree. Other departments teach technical courses concerned with topics such as systems design, programming languages, and data bases.

Our accounting students get a good introduction to many of these topics in their introductory computer course. They also learn to use a personal computer. What is missing in their background is a management orientation to the capabilities and use of computers. They certainly must be well versed in the use of personal computers and business software. However, they also must have a good overview of such areas as hardware, software, data communications, business computer systems, and how they are managed. This is the focus of the O'Brien book.

It is an excellent guide to data processing technology and its management. For example, the "software and programming" part of the book contains a chapter describing various types of programming languages and the environment in which they may be useful. This is a good supplement to the usual emphasis of introductory courses on learning to program in a particular language (e.g., BASIC).

A chapter in the "modern information processing systems" part of the book gives a good overview of data communications. It introduces the standard terminology that a manager must know if he/she is going to evaluate technical proposals and make rational choices between competing technologies. A chapter in the last part of the book discusses the management of a centralized data processing center and the type of organizational structure and personnel that one usually finds.

The text contains a wealth of descriptive material that is tied together with a good index and glossary. Accounting students who later find themselves interacting with data processing professionals will find this text to be an excellent reference source. Through the years, the text has been appropriately revised to keep up with the ever-changing focuses of data processing technology. The current edition has an unusually large number of multi-colored figures and photographs. The visual aids are extremely effective and are a major factor in the overall attractiveness of the book. The author's style is straightforward and the text is clearly written.

The book also contains a 109-page appendix providing a beginner's guide to PC DOS, WordStar, VisiCalc, dBase II, and Lotus 1-2-3. Its usefulness will depend upon the type of hardware and software that a particular college supports. The appendix material is a good supplement to the tutorials of, for example, WordStar and Lotus. It is all that most students really need to get started using these software products. But AIS instructors will wish to assign some personal computer cases (from other sources) that bring in an accounting focus.

The primary issue that an AIS instructor must deal with when considering this text is what he/she will do in class, and what the students will do besides reading the text. The discussion questions and end-of-chapter material mirror the text and are largely descriptive. To use this text effectively, the instructor must be able to relate its descriptive material to his/her experience and knowledge. It is also helpful to combine readings from the text with more discussion-oriented data processing cases from other sources. In summary, while not self-sufficient, this text can be the foundation of a very effective AIS course.

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MARSHALL B. ROMNEY, J. OWEN CHERRINGTON, and JAMES V. HANSEN, *Casebook in Accounting Information Systems* (New York: John Wiley & Sons, 1985, pp. vii, 92, $10.95 paper).

A casebook should provide realistic examples with enough complexity and loose ends so that a student has a better grasp of what to expect upon graduation, yet it should also yield conceptual insights for a student's educational growth. This paperback accomplishes both objectives.

The text is a compilation of nine cases or projects appropriate for an undergraduate or MBA course on accounting information systems. They are an integrated series of cases about accounting systems analysis and design. Project 1 covers background information about the company's business and financial data. Project 2 asks students to flow-chart an accounting system while project 3 asks them to critique the controls within the system. Given these weaknesses, the student needs to redesign the accounting system in project 4 and provide the flow-charts for the modified system. Project 5 requires the student to evaluate the corporation's sales subsystem in terms of its inputs, outputs, and software. In project 6, reports are designed along with various documents, inputs, and files. These entail the warehouse inventory subsystem. Students must evaluate a request for a proposal in project 7. Systems configuration is the topic of the next project; students select one set-up and justify their choice. Finally, in project 9 the students indicate how to plan and carry out the implementation of the system.

The cases are sound pedagogically in that they guide students through various concepts and lead them into applying their knowledge. While several good casebooks are available, the differentiating mark of this one is that all nine cases are integrated. The student works through the systems development cycle from beginning to end for one company. Besides learning something about accounting information systems, the students learn how the concepts are interrelated.

This text was used successfully in one of my classes. Students reported that they found it readable and enjoyable. They also indicated that it provided a good sense of what accounting systems are all about. Many stated that it was the best part of the course.

The book is recommended to those who use cases in accounting information systems. The authors have provided a most stimulating set of projects for students in those classes.

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H. DAVID SHERMAN, Editor, *Conceptual Frameworks for Financial Accounting* (Boston: Harvard Business School, 1984, pp. v, 159, $20.00 paper).

Any readers who still expect accountants to formulate a conceptual framework for financial accounting may abandon hope after reading these proceedings of a conference held at Harvard on October 1–2, 1982. The conference, held to honor Robert N. Anthony on the occasion of his retirement, assembled 19 academic guests of Harvard to compare and critique frameworks by Anthony, Ijiri, and the FASB (represented by Sprouse). Apparently unexpected by the planners, a fourth framework introduced by Sorter received equal prominence in the proceedings.

The book consists in equal parts of prepared remarks by the framework authors and respondents, discussion by the participants and the editor's summary, and reprints of summaries of the frameworks considered, including Sorter's.

The discussion did not contribute anything new to the conceptual framework literature, and did not resolve any of the existing conflicts. It will be interesting principally to readers who are not already familiar with the line-up of the conference participants by schools of thought. (The editor has carefully attributed remarks to 20 named participants.)

Sherman's work as editor is outstanding. He has sorted out the discussion by topics and provided helpful captions. His preface in six pages provides a readable "executive summary" which captures the tone of the rest of the book. It is this part that is recommended reading, especially for graduate students, possibly as a supplement in a financial accounting seminar.

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LANNY M. SOLOMON, RICHARD J. VARGO and LARRY M. WALTHER, *Financial Accounting* (New York: Harper & Row, Publishers, 1985, pp. xiv, 781, $30.50).

This book is designed for use in a one-semester undergraduate basic financial accounting course. (It is based on the one-year book, *Accounting Principles* by Solomon, Vargo, and Schroeder, 1983, that was reviewed January 1984, pp. 154–155.) The authors stated their goal as, "to present a solid, well-balanced discussion of the principles and practices that are used to gauge and disclose economic activity" (p. ix). With this goal in mind, the authors have developed their coverage from an accounting practice point of view. Numerous references are given throughout the book to the pronouncements of the Accounting Principles Board and the Financial Accounting Standards Board. The book appears to be designed primarily for accounting majors but can easily be understood and used by nonaccounting majors.

The book is both well written and well organized. The authors have used relevant illustrations and exhibits to help the reader, and the examples are clear and helpful. The usefulness of the text is enhanced by the inclusion of specimen financial statements, present value tables, check figures, and a glossary. Each chapter begins with a list of "Learning Objectives" that give an excellent introduction to the new material to be covered. Each chapter also contains "summary problem" and "key terms and concepts" sections that also are helpful in understanding the new material. The questions, exercises, problems, cases, study guide, and practice sets are well designed and coordinated with the text material to enhance the learning process. The book is supported with a well-rounded selection of teaching aids—Instructor's Solution Manual, Instructor's Resource Manual, Transparencies, and Teaching Transparencies. The accompanying Test Bank is well organized, but it includes only true/false and multiple-choice questions.

This book should rank very high in comparison with other financial accounting texts. It has everything that is included in the others plus some things they do not include (such as an instructor's resource manual and special teaching transparencies for the instructor).

In summary, the book and related materials are well written and error-free. Students should find the book easy to read and understand. The illustrations and examples are well thought-out and greatly assist in understanding the material. This book should be considered seriously when selecting a text for a basic financial accounting course.

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TONY TINKER, *Paper Prophets: A Social Critique of Accounting* (New York: Praeger, 1985, pp. xxii, 230, $19.95).

This interesting, but uneven and disjointed, book argues that current accounting practices encourage socially irresponsible corporate behavior, and, thus, fundamental changes are needed. These changes would involve replacement of current accounting practices which are based on a capital-based marginalist theory of value, with practices based on a labor-based Marxist theory of value. Only by removing the corrupting influence of a capital-based method of reporting firm performance, it is alleged, can corporations be made socially accountable for their actions.

In presenting its case for a Marxist or radical accounting approach, the book is organized into three distinguishable subparts. First, the author cites several recent examples of socially irresponsible corporate behavior (such as the Love Canal case involving the indiscriminate dumping of toxic chemicals in a residential area in upstate New York) and suggests that current accounting practices encourage such conduct. Second, he considers differences between the neoclassical, marginalist theory of value, with its emphasis on return on capital, and the Marxist theory of value, with its emphasis on the labor content of goods and services. Third, he argues that a Marxist or radical accounting approach is needed to make firms socially accountable for their actions.

Although written in a thought-provoking and seemingly erudite style, the book suffers from three serious deficiencies. First, while each of its subparts is interesting in and of itself, the author fails to establish a convincing connection between them to develop a systematic and convincing case for radical accounting. Attempts to tie the instances of socially irresponsible corporate behavior cited in Part I to current accounting practices, for example, are perhaps best described as innuendo or insinuation. Strong claims, such as those put forth by the author, would appear to require something more.

A second deficiency is the author's failure to provide a sufficient indication as to just what a Marxist or radical accounting approach would look like. This conspicuous absence of even the most rudimentary description of the radical accounting approach being advocated is disturbing in that the reader apparently is expected to accept its virtue on faith alone. To be taken seriously, a critic of the status quo has an obligation to offer something more constructive as an alternative than vague generalities.

A third deficiency, which relates more to style than the problems already noted, is the seemingly condescending (or perhaps contemptuous) tone with which the author discusses current accounting practices, the accounting profession, accounting academics, and accounting education in general. Typical of this distracting tone are comments such as: "Regrettably, intellectual eclecticism is not the norm in accounting. . . . [A] form of rote learning dominates most levels of education: students parrot Financial Accounting Standards Board rules and procedures without acquiring the epistemological faculties needed to critically scrutinize this catechism. . . . Matters are little better at more senior levels of scholarship" (p. 205). Sarcasm is rarely the mark of superior scholarship and, in this case, it creates the impression that the book is written to reinforce the beliefs of preexisting disciples of radical accounting, rather than to inform and convince the uninitiated.

In spite of these and other flaws in its presentation, the book is thought-provoking and, if not taken too seriously, a worthwhile reading experience for graduate students and professors. The potential reader is cautioned, however, that much of what is served up should perhaps be taken with a grain of salt.

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CAPSULE COMMENTARIES

Harvey S. Hendrickson, Editor

ROBERT N. ANTHONY, GLENN A. WELSCH, and JAMES S. REECE, *Fundamentals of Management Accounting*, Fourth Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xvi, 793, $29.95).

Changes in this edition include much fine tuning in the form of eliminating "gremlins" in the text, altering chapter sequencing, replacing approximately one-third of the 21 cases, and providing a new chapter on quantitative techniques. J. S. Reece joins the two original authors for this fourth edition.

The text follows the same basic organization used in the preceding edition (reviewed April 1982, p. 431). It is structured around a framework that the authors call the three types of accounting information, i.e., conventional absorption cost accounting, differential accounting, and responsibility accounting. This contrasts with the "purpose of information" approach found in most other managerial texts. The authors believe that their format provides a more concise organization of subject matter. The approach also means, however, that some topics (e.g., pricing) are given partial treatment in two separate sections of the text. This may confuse some readers.

Previous reviewers have commented on the low level of quantitative techniques. A new chapter on quantitative techniques in alternative choice decisions expands upon the "Optional Topic" coverage of the previous edition. It covers the economic order quantity model, decision tree analysis, uncertainty, Monte Carlo simulation, and linear programming. In addition, one of the new cases makes use of the linear programming material. In contrast to the expanded coverage of these topics, the discussion of linear regression is very limited. The quantitatively oriented material remains the weakest part of the text.

As in earlier editions, the authors emphasize absorption costing; approximately one-third of the text is devoted to this topic. Since this material is the first of the three types of accounting information discussed, it provides a natural transition for students from financial to managerial accounting. I agree with an earlier review that such emphasis on the traditional costing model is inappropriate for most students taking an introductory management accounting course. Placing the chapters on standard costing immediately following absorption costing material further emphasizes this traditional model.

The work contains many end-of-chapter questions, exercises, problems, and cases. Much of this material has been updated in this new edition. The cases include several classics, e.g., Shuman Auto, Birch Paper, and Sheridan Carpet. Unfortunately the level of difficulty of the problems differs from that of most of the cases. While the problems may be adequately rigorous for undergraduate courses, they are not sufficiently challenging for MBA students. The case material is largely at the MBA level.

The text effectively intertwines examples from the nonprofit and business sectors to supplement and enrich the discussion. Excellent coverage of management control topics and consistent clarity of exposition continue to distinguish this edition. It is definitely a quality choice for those who seek a text which emphasizes the traditional accounting model.

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M. EDGAR BARRETT and WILLIAM J. BRUNS, JR., Editors, *Case Problems in Management Accounting*, Second Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xii, 480, $28.50).

In this textbook the editors have assembled a large number of interesting and stimulating cases which present students with a wide spectrum of managerial and cost accounting problems encountered in today's corporate world.

The revised text is divided into four major sections which differ slightly from the original text. Developing and Using Cost Information includes topical areas such as cost-volume-profit, project planning, relevant costing, and multiperiod projects. Cost Accounting Systems and Analysis of Performance includes coverage of standard cost systems, full versus direct costing, profitability analysis, and variance analysis. Management Accounting in Planning and Control discusses budgeting, responsibility centers, divisional performance measures, and capital budgeting. In this section the editors also have attempted to introduce topics such as inflation, asset price changes, and functioning in a multinational environment. The final section consists of comprehensive cases that deal with interrelated issues covered earlier in the text.

Three major differences distinguish the revised edition from the first (reviewed October 1982, p. 829). First, realism has been improved by updating many of the price and cost data used in the problems. Second, new cases have been added in both the cost analysis and cost accounting sections. Finally, the material in the original edition that dealt with managerial issues in financial reporting has been eliminated. This has sharpened the focus of the text and kept the material more in line with what a user would expect to find in a text of this title.

An excellent Instructor's Manual is provided for instructors who are less experienced or uncomfortable in using case analysis. As in the earlier edition, analysis of each case is divided into five sections: Substantive Issues Raised, Pedagogical Objectives, Opportunities for Student Analysis, Suggestions for Classroom Use, and Suggested Questions. The case analysis is not necessarily written by the author of the case; instead it often represents a compilation of teaching notes and experiences encountered by instructors who have used the case. Thus, although one might not totally agree with the analysis presented, it is an invaluable teaching aid that alerts the instructor to the kinds of questions commonly raised when the case is discussed.

The book is designed to be the primary text at either the graduate or undergraduate level. This becomes apparent when one examines individual cases. Of the 52 presented, slightly more than half have a series of questions to aid students in analyzing and structuring their analysis of the case. The remaining cases provide no questions, leaving the student with the responsibility of structuring a response. This dichotomy gives instructors an opportunity to take procedural and/or conceptual approaches to a given topic.

This book fills the need for a quality managerial accounting casebook. Those interested in using the case method as a teaching approach in an elective course, a required course, or as a supplement in a traditional managerial course, will find this to be an outstanding collection of cases.

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AHMED BELKAOUI, *Accounting Theory*, Second Edition (San Diego: Harcourt Brace Jovanovich, Publishers, 1985, pp. x, 484, $28.95).

Although this new edition covers essentially the same subject matter as the first (reviewed January 1982, pp. 212–213), some significant improvements and additions make it more readable and current.

First, the book, now in hardcover, has a new character style and sub-headings in boldface type to improve its readability and ease the locating of topics.

Second, a number of topics have been moved to new chapters (increasing the number to 11 from nine in the first edition). The regulatory approach to formulating an accounting theory is now in a separate chapter and has been expanded to include treatment of "Who Should Set Accounting Standards" and "How Do We Discipline the Accounting Profession?" The treatment of the human information processing approach has been improved while the predictive approach has been moved to a new chapter to be combined with the newly added positive approach. This new chapter also includes new material on the informational content of financial accounting numbers and an evaluation of the "prediction of market reaction" approach. The chapter on the conceptual framework has been retitled and rearranged, and some parts have been expanded to improve the treatment. Each of the primary and secondary qualitative characteristics is covered rather than only being listed, and coverage of the Stamp report issued by the Canadian Institute of Chartered Accountants has been added.

This edition also has a heavy emphasis (three chapters) on current value and price-level accounting. Unfortunately, this edition was prepared too soon to include some of the recent research and FASB changes in the disclosure of price-level change information. The chapter on future trends in accounting still is a brief review of several topics, but three are new: cash-flow accounting and reporting, employee reporting, and value-added reporting.

Overall, this edition is very similar to the first. But the changes in text style and the rearrangement of subject matter make it easier to read, and the addition of new material keeps it current. Although it does not attempt to cover a number of contemporary issues (such as pensions, income tax allocation, and other FASB agenda items), it does provide a good summary of the attempts accountants and academicians have made to develop a generally accepted framework for financial accounting and reporting. For many courses this book probably will need to be supplemented with articles and/or other books. The extensive list of references at the end of each chapter should make this easy to do. Since the author succinctly summarizes many different works, it would be advisable to refer students to the originals to increase their understanding and/or to introduce them to the literature. An ample number of questions follow each chapter and should be useful in stimulating class discussion. The book is suitable for both undergraduate and graduate (master's and doctoral) seminars.

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AHMED BELKAOUI, *Industrial Bonds and the Rating Process* (Westport, CT: Quorum Books, 1983, pp. xii, 198, $29.95).

The literature on the bond rating process has expanded of late after a period when little was written on the subject. Professor Belkaoui's contribution is designed "to demystify the process by which bonds are rated" (dust jacket). The book does not contain much in the way of a concrete discussion of the processes by which the rating organizations go about assigning their bond ratings. However, it does present a useful summary and discussion of:

1. The nature of bonds and the various types of instruments in existence;
2. The nature of the rating process;
3. Some overall analytical tools used by raters; and
4. A survey of bond rating prediction models.

In addition the author, having learned from and pointed out the shortcomings of previous models, presents his own multiple discriminant model designed to predict industrial bond ratings.

The book should be useful to students and others who desire to learn in general about the rating process. Corporate officers will not find many clues to the specific steps taken by rating agencies in the rating of their debt securities, but they will find an additional prediction model that they can test for use in their decision-making processes. Thus, those who believe in predicting the predictions will have added one more model to their arsenals.

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SIDNEY DAVIDSON, CLYDE P. STICKNEY, and ROMAN L. WEIL, *Financial Accounting: An Introduction to Concepts, Methods, and Uses*, Fourth Edition (Chicago: The Dryden Press, 1985, pp. xvii, 877, $33.95).

This fourth edition reflects the results of years of classroom testing and revision. It is essentially error free and effectively introduces concepts, methods, and uses of accounting. This introductory text is written at an appropriate level for use with MBA's, although undergraduates are the primary market. The full text can be covered effectively in one semester.

The focus is primarily conceptual. Plentiful resources are available to allow individual instructors to vary the scope and rigor of the course. The problems are extensive and offer substantial variety in both scope of material and difficulty. They are supported by accurate solutions in the Instructor's Manual and Test Bank. Each chapter contains self-study problem(s), and Appendix A provides a complete set of financial statements with extensive annotations.

The authors realize that accounting is a language and that a subsidiary role of the accounting course in many curriculums is the introduction of such areas as characteristics of business practices and financial instruments. Thus the book introduces new terminology carefully. Italics identify important terms, and exercises often are available to reinforce definitions. A complete 77-page glossary is included in an appendix.

The first five chapters introducing the three primary financial statements and the fundamental accounting procedures are followed by a chapter on financial statement analysis. These six chapters constitute an effective module. The statement of changes is introduced earlier than in most texts (Chapter 5) and assumes full status as a major statement. The first chapter offers an effective overview and the sixth uses ratios and other analytical tools to solidify the understanding of the basic process. The intervening chapters present debits, credits, and journal entries while maintaining a clear focus on the ultimate communication of information via financial statements.

The next eight chapters are a conceptually oriented tour of the balance sheet. One can quibble about the amount of attention focused on one topic or another, but the fundamental structure is sound. The book presents the essence of each issue and by choice of problems or occasional augmentation the individual user can create the desired focus. The final chapter addresses choices of accounting method and the impact of these choices on reported income.

The revision was not a major one (the third edition was reviewed January 1983, pp. 183–84). Some of the discussion has been improved and a number of new exercises and problems have been added. The chapter on the Statement of Changes in Financial Position was revised to eliminate the funds definition of working capital, a change some will regret. Tracing problems from the prior edition to the new one is somewhat difficult, but this should only trouble continuing users.

Overall, the text remains a very solid, reliable, effective introductory text. Its clarity, flexibility, completeness, and accuracy make it an easy book from which to teach, if a high-level conceptual approach is desired.

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JOHN DOWNES and JORDAN E. GOODMAN, *Dictionary of Finance and Investment Terms* (Woodbury, NY: Barron's, 1985, pp. x, 495, $6.95 paper).

This dictionary of over 2,500 terms used in the banking and securities industries is an outstanding addition to the several currently available. It has clear and concise definitions, high quality paper and covers, a pocket-book size, and an affordable price. It is a useful reference for accounting and finance professors, authors, practitioners, and students.

H.S.H.

PAUL D. EPSTEIN, *Using Performance Measurement in Local Government: A Guide to Improving Decisions, Performance, and Accountability* (New York: Van Nostrand Reinhold Co., 1984, pp. xviii, 237, $36.95).

This book suffers from two drawbacks: it treats performance measurement as a separate discipline, without linkage to an appropriate framework, and it is unclear for whom the book is intended. On the other hand, many of the examples contributed by local government are well written, useful, and challenging.

The definitions of basic terms such as effectiveness and efficiency are tangential to those of the United States General Accounting Office (GAO), which have broad professional acceptance. Thus, the author's definitions may be confusing to some. Moreover, the examples describe a variety of well known techniques, including MBO, performance auditing, and organizational development; in these cases performance measurement may play an important, but subsidiary, role.

The author classifies measures of effectiveness into measures of community conditions, measures of service accomplishments, measures of citizen or client satisfaction, and measures of unexpected adverse impacts. But for most measures, insufficient guidance is given. For example, according to the author, community conditions may be measured by "trained observer" ratings, standards set by other governmental units, and standards measured "by special equipment" (p. 14). The illustrations contain measures of the types indicated, but no comprehensive index has been provided that would make the examples readily accessible to the reader. Moreover, the cases do not follow a uniform structure. This makes it difficult to compare individual studies, to classify them by functional area, or to extract improvement ideas.

The author's measurements tend to be broad-brush. For example, project management measures are suggested as "number of projects proceeding or completed on time, number of projects within cost, total cost of projects compared to planned cost" (p. 26). These measurements are crude from a project management standpoint, since they cannot be used to promote improvement or to take cost containment action. Similarly, the author notes that "[t]he labor used in each government organization measured cannot be treated in a lump sum but *must be accounted for by each activity*. . . . This practice is called *cost accounting*" (p. 21). Unfortunately, the author does not mention the controls that need to be built into the cost accounting system or the types of variances required by government.

To summarize, the book has valuable individual cases, but its organization and referencing of information are poor. It does not fulfill the expectations suggested by its title and is not suitable for use as a text or a course supplement.

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DAVID F. HAWKINS, BARBARA A. BROWN, and WALTER J. CAMPBELL, *Rating Industrial Bonds* (Morristown, N.J.: Financial Executives Research Foundation, 1983, pp. x, 269, $9.00 paper).

This study, commissioned by the research arm of the Financial Executives Institute, has as its primary objective a study of the behind-the-scenes workings of bond rating agencies. Its primary intended usefulness is in helping financial executives obtain and keep the most favorable ratings for their companies' bonds.

The first three chapters contain a comprehensive and rather thorough discussion of the workings of the national debt rating agencies and the methods by which they assess debt quality. Much emphasis is placed on how management can best prepare to impart a most favorable impression to the rating agencies. Not only quantitative analyses, but also qualitative and intangible considerations play an important part in the final determination of a rating. The rating agencies have resisted long and hard all attempts by researchers and others to pin them down as to the exact process by which they arrive at ratings given a set of measurable factors in a given situation. Thus, this study tries to shed light on which management strategies may create the most favorable impression on the raters. Areas covered include the initial contact, meetings by senior executives with the agencies, and well prepared presentations. These chapters also contain a wealth of criteria, such as ratios and other measures and considerations, used by the raters in evaluating the debt indenture provisions, financial resources, level and stability of earnings and leverage, asset protection, and management quality. In conclusion, the authors identify cash flow as the most important factor bearing on a company's viability. Of importance in addition to the ability to generate cash is the company's capacity to have access to cash.

Chapter 4 contains a comprehensive discussion of bond rating prediction models. Also considered are in-house rating and prediction models developed by financial advisors and institutional investors. Some of these approaches attempt to simulate the agencies' rating processes.

The last chapter (5) contains a comprehensive discussion of the pros and cons of including debt ratings in registration statements filed with the Securities and Exchange Commission. While it did invite discussion of this issue, the SEC has issued no definite ruling on this matter.

Overall, the authors have substantially attained their objectives by providing in five chapters and in elaborate appendixes a wealth of material about the quantitative as well as the qualitative aspects of the debt rating process.

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GARRISON KEILLOR, *Lake Wobegon Days* (New York: Viking, 1985, pp. xiv, 337, $17.95 cloth, $8.95 paper).

One may wonder why this book of fiction and fantasy should merit space in a journal devoted to truth and credibility. The persons, places, and events are fictional, but the author uses composite characters and events to brilliantly capture the essence of an era (primarily from the 1930s to the present) and a region (the midwest with Minnesota as the locus).

Having followed Mr. Keillor's program on public radio for more than five years, having listened to tape recordings from the monologue portions of these programs, having seen him perform and enthrall a non-midwestern audience, and having read this book, I have concluded that this "yarn spinner," also often appropriately called a modern day Mark Twain, has an ability that might be useful to accounting teachers, practitioners, and students. That is his uncanny ability to capture the essence of details and make them interesting and entertaining. Consider what the development of such an ability might do for the typical image/stereotype of accountants or for management's discussion and analysis: developing it into a report that is not only truthful but also understandable, interesting, and occasionally entertaining.

H.S.H.

WALTER B. MEIGS and ROBERT F. MEIGS, *Accounting: The Basis for Business Decisions*, Sixth Edition (New York: McGraw-Hill Book Co., 1984, pp. xxiii, 1104, $26.95).

Like its predecessors, this edition is for use in a two-semester introductory undergraduate accounting course. The primary emphasis is on financial accounting, with only six of 28 chapters devoted to managerial accounting topics. Although some material has been added and some has been rearranged, this edition retains virtually all the text and assignment material from the previous edition (reviewed January 1982, pp. 226–228).

Several changes deserve mention. Chapter 5, Accounting for Purchases and Sales of Merchandise, has been expanded to illustrate both multi-step and single-step income statements. Chapter 15, Partnerships, includes a brief discussion of the nature of limited partnerships. Recent changes in tax laws have been incorporated, including the Accelerated Cost Recovery System (Chapter 11, Plant and Equipment: Depreciation), indexing, the Economic Recovery Tax Act, changes in tax rates, and IRA and Keogh plans (Chapter 20, Income Taxes and Business Decisions). Chapter 28, Relevant Information, Incremental Analysis, and Capital Budgeting, has been restructured to emphasize the concept of relevant information. The concept is applied to various short-term decisions. Despite this restructuring, the problem material following Chapter 28 is virtually identical in conceptual coverage to the previous edition. This is true throughout the text, despite the authors' claim to have increased the number of problems and to have revised them.

Chapter 7, Accounting Systems: Manual and EDP, provides the only direct exposure to EDP systems. A discussion of basic computer topics (hardware, software, CPU, and others) has been removed, so the focus now is on the use of computers. But this focus is limited to Chapter 7, since the authors fail to integrate the material into the remainder of the text.

The authors state that "Chapters 24 [Accounting for Manufacturing Operations] and 25 [Cost Accounting Systems] have been carefully revised to illustrate more clearly the flow of product costs" (p. xx). A review of the chapters indicates that the changes to the text and illustrations are marginal, leaving the treatment of cost flows substantially unchanged.

Included in the comprehensive set of supplemental materials is a computerized practice set. The practice set is a straightforward application for students with little or no computer experience. It requires a series of journal entries and provides help for students who enter errors.

The text, overall, is appropriate for the undergraduate introductory course. Its approach is most appropriate for accounting majors, primarily because of the completeness of coverage. The authors make some attempts to emphasize a more conceptual approach, as in Chapter 17, Corporations: Operations, Earnings Per Share, and Dividends. This text may be most acceptable to the professor favoring a heavy emphasis on financial accounting.

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LOREN A. NIKOLAI, JOHN D. BAZLEY, RICHARD G. SCHROEDER, and ISAAC N. REYNOLDS, *Intermediate Accounting,* Third Edition (Boston: Kent Publishing Co., 1985, pp. xv, 1,344, $44.25).

This third edition, like the second (reviewed January 1984, pp. 149–150), is organized as a traditional intermediate accounting text. One improvement is the earlier coverage of the statement of changes in financial position.

The authors have done an excellent job of updating the material while retaining clarity of presentation and technical accuracy. The illustrations are well designed, many taken from published financial statements. Flowcharts are used liberally to clarify the more technical pronouncements. Those for earnings per share and asset exchanges are especially useful.

The text contains an adequate selection of cases, questions, exercises, and problems varying in degree of difficulty. Like most other intermediate texts, a complete set of support materials (transparencies, test bank, study guide, solutions manual, and instructor's manual) are available. Unlike many other texts, an annual newsletter, titled *The Intermediate Account*, is supplied to all adopters. It summarizes new accounting developments and pronouncements for the year.

Some of the more significant changes incorporated into the third edition are the following:

- The conceptual framework, as presented in Chapter 1, is integrated into subsequent chapters as appropriate.
- The book has been divided into five parts, with an introduction to each part. The introduction provides an overview of the material to be covered in the ensuing chapters.
- Increased attention, especially in Chapters 3 and 25, is given to SEC reporting issues, and integrated disclosure in particular. With many companies "incorporating by reference," it becomes more important for students to have some understanding of the SEC's role in financial reporting.
- Spreadsheet problems (electronic spreadsheet templates) have been added as an optional package for adopters of the text.

Although the book does have a couple of weak points, they are minor. First, the use of three alternative methods of accounting for sales discounts and purchases discounts is somewhat confusing and unnecessary. Second, the authors use the "direct" as well as the "add-back" approach to presenting cash provided by operations; but use only "add-back" in the section covering the working capital concept of resources.

Overall, this is a strong textbook, and should be seriously considered for adoption by those desiring clarity of coverage as well as technical accuracy.

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ARNOLD J. PAHLER and JOSEPH E. MORI, *Advanced Accounting: Concepts and Practice*, Second Edition (San Diego: Harcourt Brace Jovanovich, Publishers, 1985, pp. xii, 1,056, $34.95).

The second edition of this text is similar to the first (reviewed January 1982, pp. 232–233), with basically the same format and coverage of topics. Pedagogical changes include splitting the material on intercompany transfers of inventory and fixed assets into two chapters, and the expansion of the material on translation of foreign currency financial statements and translation of foreign currency transactions into two separate chapters. This, like the first edition, uses the financial statement approach to consolidating statement worksheets in the chapter material and illustrates the trial balance approach (which was not covered in the first edition) in appendices to several chapters.

A favorable feature is the continued use of a well-designed expanded analysis of the investment account to develop the amounts for the primary elimination entry. In the first edition, elimination entries that were required because of the income tax effects arising from timing differences in recognizing intercompany gross profits were integrated throughout the relevant chapters. But in the second edition, this desirable feature is eliminated from the chapters and assignment materials and relegated to less than one page in an appendix.

The discussion of partnerships still consists of three well-written chapters with excellent coverage. A unique feature of the first edition, which is discontinued in the current edition, was the inclusion of the full text of the Uniform Partnership Act in an appendix. In the second edition, only two sections of the Uniform Partnership Act are presented in an appendix.

Supplementary materials available include transparencies to all problems in certain chapters, a test booklet, and an improved instructor's and solutions manual. This manual includes not only solutions to assignment materials, but also suggested student assignments, teaching suggestions, and descriptions of each discussion case, exercise, and problem, along with an estimate of its difficulty and time for completion.

Also new with this edition are partially completed working papers for problems in some of the chapters and a consolidations template with a manual for working consolidation problems on a computer.

In summary, this is a well-written, up-to-date edition from which some of the redundancy found in the first edition has been eliminated. It deserves serious consideration for adoption in advanced accounting courses.

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JACK C. ROBERTSON and FREDERICK G. DAVIS, *Auditing*, Fourth Edition (Plano, TX: Business Publications, Inc., 1985, pp. xxii, 794, $32.95).

The previous editions of this auditing text have been distinguished by their intellectual rigor and emphasis on concepts, logic, and a "scientific approach" to auditing (the third edition was reviewed October 1982, pp. 851–852). This edition happily continues that approach with a renewed focus on decision making in auditing.

The authors seek to instill in the student an orderly process for making decisions about auditing questions. This approach forces the student, each time he or she confronts an issue, to think about it in a structured way. This structure requires formulation of a hypothesis, collection and evaluation of reliable evidence and other information, and reaching a conclusion supported by evidence.

This approach has considerable intellectual bite. The authors respect their readers; they do not write down to them. This is the way it should be given the preponderance of very high quality students presently in the management schools.

Each chapter begins with a set of learning objectives so the student can keep in mind the direction of the discussion. The review questions build on this by giving the serious student a means of anchoring the salient points. I would have liked to see the inclusion of sets of multiple choice questions from recent CPA examinations. Students need much experience in thinking through the semantic problems often found in such questions. The authors do provide the instructor with a separately bound test bank volume containing such questions that could be included in take-home assignments.

The chapters on computer auditing and statistical sampling are strong. Auditors' liability and legal relationships are discussed with clarity and insight in Chapter 4. Nevertheless, it would have been well to expand the appendix to include some interesting recent cases such as Equity Funding. Excitement could have been added by the inclusion of anecdotal material such as the lively writing on auditing events judiciously selected from *The Wall Street Journal*.

Changes in this edition include end-of-chapter questions tied to stated learning objectives, a new chapter on governmental and internal auditing, emphasis on audit risk throughout the text, and a good discussion of auditors' associations with and reports on forecasts and projections.

The new edition retains the scholarly and comprehensive qualities of the book's previous editions. The instructor who appreciates depth and challenge in an auditing text should be pleased with this fine book.

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WILLIAM V. RUCH, *Corporate Communications: A Comparison of Japanese and American Practices* (Westport, CT: Quorum Books, 1984, pp. xiv, 298, $35.00).

The author teaches business courses in the European division of the University of Maryland and lived and taught in Japan for two years in the early 1960s. In this book he examines and compares business communications systems in Japan and the United States.

The book is divided into three parts. Part I describes some distinctive characteristics of the Japanese culture and corporate structure and traces their impact on business communications in Japan. Here, the author points out such factors as the complex nature of the Japanese language, the significance of nonverbal communication, group orientation, and lifetime employment.

Part II deals with American practices. After a brief review of theoretical aspects of corporate communication, the author examines various media—written and oral—used for downward and upward communications in American corporations: annual reports, company newspapers, magazines, newsletters, bulletin boards, orientation manuals, letters to employees' homes, pay envelope inserts, manuals, handbooks, mailgrams, telephone messages, closed-circuit television, teleconferencing, films, videotapes, electronic mail, employee attitude surveys, memorandums, reports, suggestion systems, question boxes, meetings, managers' meals, plant panels, telephone hotlines, quality circles, and other methods.

Part III provides a comparative analysis of Japanese and American enterprises. The analysis is summarized in five tables, showing differences between the two in the areas of culture, business practices, management, employees, and internal communication systems. The author argues that the Japanese communicate better than the Americans, and that Japan has the competitive edge in the Information Age. Thus, he concludes, "If America learns one lesson from the success of Japan in world industrial markets, it should be the importance to any organization of those at the top providing opportunities to those at the bottom to communicate with them, and then paying keen attention to what they have to say" (p. 262).

The book is based largely on a literature review with some data gathered from the author's interview survey of Fortune 500 companies in 1980. The major shortcoming of the book is that it has too many citations and long, direct quotations that make the reading tedious.

The topic dealt with seems certain to draw more attention in the future due to the increasing level of cross-investment and managerial exchange between the United States and Japan. The book contains an extensive bibliography and an appendix that contains the General Motors' Communication Policy. Thus, it can serve as a supplement in international courses and as introductory material for persons interested in cross-cultural corporate communication systems.

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R. F. SALMONSON, JAMES DON EDWARDS, and ROGER H. HERMANSON, *A Survey of Basic Accounting*, Fourth Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xvi, 675, $27.95).

This "tried and true" text, a description that might be given to any fourth edition, continues to be workable and to uphold its reputation as a very satisfactory one-semester text. It is especially appropriate at the graduate level and particularly for nonaccountants. General comments made when the previous edition of the text was reviewed (October 1981, p. 1014) continue to hold.

The fourth, like the previous edition, has 20 chapters, the first 12 of which are still directed to financial accounting aspects with the remaining eight directed to managerial accounting. Most instructors probably will find the "mix" quite satisfactory for a course covering both financial and managerial topics.

The review of the previous edition noted that the chapter on "internal control of cash" was very short. The authors apparently were not moved by this comment, since the chapter continues to be short. In a course especially attractive to nonaccountants, the subject of internal control and the control of cash would seem to be important. Coverage is minimal also when one considers what might have been done. For that reason, the chapter will be considered by many to be the weakest in the text.

The book is flexible to facilitate the skipping of chapters if necessary. For the typical nonaccounting graduate survey course, such selection is likely to be necessary. Most will find the text unsatisfactory for accounting majors for whom a stronger foundation is necessary. For that reason, one may question whether the text is as adaptable as the authors contend for "further courses dealing with the accumulation, interpretation, and use of accounting information" (p. viii). This is a matter for potential adopters to consider.

Each chapter concludes with a Summary, Questions, Exercises, and Problems. Although not overly plentiful, users normally will find each adequate. Continued use over several semesters may cause one to desire additional problems, yet this can hardly be considered a drawback. The Questions and Exercises are generally quite satisfactory, although an occasional one requires information not mentioned in the text. This was particularly noted in the combined Study Guide and Working Papers.

For example, a question in the Study Guide raises the point of whether the cost of removing an old asset to make room for a new one was to be a cost of the new. This was not even discussed in the chapter. The "rules" on assigning costs also were not spelled out in an effective way. Another question in the Study Guide on depreciation was incorrectly solved by dividing by the wrong number of years. One normally would expect more from a book by this publisher and these authors, especially in the fourth edition.

Despite any comments which might be interpreted as unduly negative, the user will find the textbook itself generally to be quite satisfactory. It does a very adequate job of what it sets out to do. Generally it is well-written and easy to read. The illustrations are not overly numerous but will likely be considered satisfactory.

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MARK STEVENS, *The Accounting Wars* (New York: The Macmillan Publishing Co., 1985, pp. x, 261, $16.95).

Written by a journalist as a sequel to *The Big Eight* (reviewed October 1982, pp. 856–857), this book's jacket and foreword suggest an emphasis on the "Second Tier" and local accounting firms. But it fulfills neither its title nor its objectives. Instead it is a series of "war stories," interestingly written in a journalistic style, on the activities and problems of accounting firms and an update on some of the issues related to the evolution/revolution in the public accounting profession and its environment. Greatest coverage is given to two "Big Eight" firms (Price Waterhouse and Touche Ross) and two second-tier firms (KMG Main Hurdman and Laventhol & Horwath); a few pages also are devoted to one local firm (Israeloff Trattner). Activity/problem coverage includes the entry of major firms into China, tax shelters, the evolution/revolution in the U.S. from an industrial to a service economy, and the acceleration of competition and entrepreneurship among accounting firms.

Disappointing for a second book on the public accounting profession and suggestive of careless research is the changing of John C. (Sandy) Burton's name to Sanford Burton in both the text (p. 179) and Index (p. 255).

This book, like the first, is largely at a very general level. Most of it was compiled from previously published materials (for which citations are given) and some from personal interviews. Despite its faults, it is recommended reading for informed academic, practitioner, and student accountants.

H.S.H.

SOFTWARE SUMMARIES

Harvey S. Hendrickson, Editor

Alcar Software: The Value Planner (Skokie, IL: Alcar, Inc., 1985, $4,000.00, manual and 5 disks).

Current trends in business education include: the shift in financial valuation from accounting ratios to the present value of cash flows; the increased use of microcomputer spreadsheet software, such as Lotus 1-2-3; and the increased use of financial databases such as Compustat. Thus a clear need exists for software to value firms and alternative strategies based upon cash flows; to use a microcomputer with the good points of 1-2-3, such as its interactive approach, but avoiding its deficiencies, such as a possible loss of control; and to tie in with mainframe databases, such as Compustat. A program now is available that can accomplish these goals: the Value Planner (VP) from Alcar, Inc. The VP is based upon the time-sharing model used for mergers and acquisitions over the past several years by the clients of Al Rappaport at Northwestern University.

The VP may be used both to forecast the financial outcomes of various corporate strategies and to assess the contribution of those strategies to the creation of shareholder value. Shareholder value is measured in terms of discounted cash flows, and the VP thus provides a convenient conversion of accrual-based financial statements into economic cash flows.

The VP has three principal components: the Forecaster, the Valuator, and the Calculator. However, the entire program is menu driven, making it relatively easy to operate, and making moving from one component to another a straightforward process.

The Forecaster provides a blank template of 25 periods upon which a user can build historical and projected financial statements, using a particular firm's account structure. The user begins by entering historical monthly, quarterly, or annual financial statements. For convenience, the VP provides a standard set of account titles, but the capability exists to customize account names and add or delete accounts.

After the user provides the usual information from income statements and balance sheets, the Forecaster calculates funds flow, financial ratios, cash flow, and an earnings/cash flow reconciliation. Typically the funds flow will not balance on the first pass. If no input errors were made, the problem usually is the result of "prior period adjustments" to retained earnings. The Forecaster allows the user to manually adjust funds flow sources or uses to eliminate this particular problem. The funds flow balancing problems will not occur in forecast periods because the Forecaster automatically balances the projected funds flow statements.

The initial input of data is the tedious portion of the VP, but the results are gratifying. Having entered a corporate history, the user can readily evaluate historical trends and averages, which are calculated by the program.

The next step in using the Forecaster is to project income statements and balance sheets for the firm. A number of options are provided to forecast the accounts involved. The screen for each account includes historical values and trends for the account, presented in a format consistent with the chosen forecast method. Choosing the proper length for the forecast is crucial. The forecast period represents the length of time the user anticipates that a business or strategy will be able to generate a return greater than the minimum rate of return required by investors. The process of forecasting moves quickly once the user understands what information is being requested. After completing the first pass, it is easy to fine-tune and/or "what if" the forecast by editing selected accounts.

The Valuator is available in three versions: the Full, the Basic, and the Scratchpad. The Full Valuator is based on a complete set of forecasted financial statements, as described above, and is the most comprehensive. The Basic and Scratchpad Valuators require decreasing amounts of input, with the Scratchpad based on only 12 key valuation variables held constant across the forecast period.

This portion of the VP program is based on current financial theory that is thoroughly explained by accessing the help function or referring to the manual. The Valuator section also offers an analyze key that provides the formulas used to calculate any number displayed on the screen. The value of a business or strategy is calculated by adding the cumulative present value of the cash flows from the forecast period to the value created after the forecast period, or the residual value of the firm. A number of choices are offered for calculating the residual value of the firm, and the appropriate selection is crucial, since on average 80 percent of the value of most firms rests in their residual value. The default choice is the commonly used perpetuity method.

The Valuator may be used to assess whether a stock seems to be undervalued or overvalued by the market in comparison to one's expectations of future performance. It is particularly useful for merger, acquisition, and divestiture analysis. It also can be used for evaluating and selecting strategies or projects and for determining internal rates of return generated by alternative strategies and scenarios. The Valuator also includes "sensitivity screens" for determining the sensitivity of shareholder value to changes in key factors such as sales growth, profit margin, cost of capital, and investment requirements.

The last component of the VP is the Calculator that provides a convenient way to calculate items such as the cost of capital, tax rates, market value of debt, and affordable dividends.

A number of print options are available; these include the choice of printing statements in common and absolute dollars. Information can be exported to text files and imported from or exported to WKS or WRK files. Eleven pre-defined graphs also are available for export and printing.

One of the most important aspects of the use of Alcar is that it protects the user from making errors that can occur in the use of spreadsheets. As an example, it is possible in 1-2-3 to replace a formula with a value during the "what if" or fine-tuning stage and recalculate the spreadsheet to get incorrect results. This error then would be virtually undetectable. Alcar eliminates this type of difficulty by separating the formulas and the values to ensure that the data remain in balance.

Alcar also can read and write 1-2-3 files. This allows it to use data generated by other sources as well as 1-2-3's graphic capabilities with the results of the Alcar computations.

The VP program as a whole would be a valuable addition to advanced courses in accounting, management, and finance. The degree of complexity could be scaled by having students begin from scratch, or by giving them a history and requiring that they build a forecast, or by merely having them revise a forecast already constructed. Students could analyze the impact of various strategies on shareholder value or use the program as a tool for industry and competitive analysis. Finally, the VP is an excellent tool for the consultant hired to help a small firm evaluate the feasibility and worth of particular strategies, or to help small firm owner/managers determine the price to set on stock, when raising capital or selling out.

Although considerable flexibility is provided for customizing account structures and forecast methods, the VP should not be used for forecasting a firm's monthly operating budgets. This is because the VP does not sum accounts across periods and provide a totals column, nor does it provide the degree of flexibility for forecasting that is standard in the typical electronic spreadsheet. The prime purpose of the Forecaster portion of the VP in the context of the entire program is to provide the foundation for the Valuator section.

The minimum equipment required is an IBM or IBM compatible, two floppy disk drives or one floppy disk drive and a hard drive, and 256K RAM (DOS 2.0 or 2.1) or 312K (DOS 3.0). But the flexibility to customize financial statements by adding subaccounts is severely limited without at least 512K of RAM and the time required for calculation is prohibitive without the addition of a math coprocessor (8087).

Not only is Alcar slow in making recomputations, its program provides no batch capability. Thus, it is not possible to instruct the program to make a series of steps (perhaps involving a number of recalculations and printing of a number of pages) and then return when these steps are completed. The user must remain at the computer and select choices from menus as they appear on the screen.

Also, while the use of 1-2-3 files is welcome, the use of external data can result in a tedious process of converting an ASCII file (say from a mainframe Compustat database) into 1-2-3 and then into Alcar. It would be very convenient to be able to read in ASCII files directly.

As the VP includes five floppy disks, a hard disk system is a welcomed convenience. The menu offers a help selection throughout, but it is easier to read the excellent support manual rather than flip disks around if a hard disk is not available.

Perhaps the principal drawback of the VP is that its prodigious power might lull the user into a false sense of over-confidence in the results provided. It is appealing to have a specific number valuation placed on a particular firm and its accompanying strategy. But the user must remain aware that the projection of shareholder value is only as good as the forecast, and the forecast is very dependent upon the forecaster's grasp of the firm, its industry, and its environment.

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KAZ OCHI and PATRICIA J. HUGHES, *Accounting with Lotus 1-2-3* (Belmont, CA: Wadsworth Electronic Publishing Co., 1983, pp. ix, 276, $19.95 paper including disk).

Accounting with Lotus 1-2-3 provides an interesting supplement for integrating computer applications into financial accounting courses. Originally designed to provide business and professional people with the keystrokes necessary to prepare the various spreadsheets, this text is remarkably successful in the classroom setting. Part of this success relates to the completed spreadsheets being genuinely workable, rather than sterile textbook problems; they contain features that highlight computer strengths such as an aging analysis, an aging graph, and a customer subsidiary ledger in the accounts receivable spreadsheet. The presentation is well arranged and clearly presented. The keystrokes are tabled in a format which first describes each keystroke and then explains its function; additional commentaries are interspersed throughout. The programs use a wide variety of Lotus 1-2-3 commands and include some data base management.

In my opinion, decreasing the publisher's restrictions would allow a superior utilization of the text. If students could be given partially programmed templates for some of the worksheets, the time constraint would be lessened and some of the repetitious elements of setting up worksheets would be removed. A brief tutorial also would be helpful, and some method of referencing various procedures would make the book more useful. The lack of a reference system hinders the user from easily returning to demonstrated procedures at a later date.

In summary, this text is an effective computer application supplement for financial accounting. Students with little or no computer background receive valuable exposure to real-life, reasonably sophisticated applications of Lotus 1-2-3 procedures and also can become comfortable with the IBM PC and Lotus 1-2-3 software. Although the text could be used to supplement an introductory course if sufficient staff and computer capacity are available, most universities probably would introduce it at the intermediate accounting level.

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NEIL SEITZ, *Business Forecasting: Concepts and Microcomputer Applications* (Reston: Reston Publishing Co., Inc., 1984, pp. x, 192, $17.95 paper).

This is a short, well-written book on forecasting concepts and methods. A notable feature is the BASIC language program for each of the methods. The book is appropriate for undergraduate accounting majors, and I have used it effectively as a supplement in a course on budgeting, planning, and forecasting. It also would be suitable as a supplement in a course on quantitative methods or advanced cost accounting.

The strongest feature is its clear descriptions of the forecasting methods. These include simple linear regression, multiple regression, nonlinear regression, trend analysis, simple decomposition analysis, decomposition analysis with two cyclical components, simple moving averages, weighted moving averages, adaptive filtering, exponential smoothing, and Monte Carlo simulation. Each method is illustrated with a comprehensive example. After studying the chapter and reviewing the model problem, most students will be able to solve the end-of-chapter problems without difficulty.

Included are additional chapters on evaluating forecast accuracy, modeling and simulation, and collecting and managing data for forecasting, and four short appendices. The first appendix is a brief discussion of basic statistical concepts (with examples and exercises) and the use of the standard normal distribution table in Appendix D. The standard normal distribution is not referenced in the body of the text. Instead, the *t*-statistic table (Appendix C) is frequently referenced throughout the book, but its use is not explained. Appendix B lists "Commonly Used Data Sources" with a brief discussion of each.

Despite the book's title, it has little on the conceptual development of forecasting methods. For example, the first chapter includes a table on the selection of a forecasting method that uses a highly simplistic approach. The instructor may wish to include additional lecture material to remedy this deficiency.

Another major feature of the book is its microcomputer applications that consist of a BASIC language program for each forecasting method. The programs are written in a dialect of Microsoft BASIC and with some modification can be run on most microcomputers. Since no diskette of programs is available, the programs must be entered from the keyboard. At best, this is a tedious process with little if any educational value. Furthermore, not all of the programs run as expected. Providing a diskette of programs to the student would reduce the typing requirement, but would not improve the educational value significantly.

Although all of the students in my class had some experience with BASIC, no assignments using the BASIC programs were made. Fortunately, the students could use an electronic spreadsheet to solve all of the assigned problems. For some students, this was their first experience with a microcomputer and an electronic spreadsheet. The SuperCalc[3] electronic spreadsheet was used because students find it is easy to learn and use, but Lotus 1-2-3, Multiplan, or almost any other spreadsheet would have been equally acceptable. Having students use an electronic spreadsheet rather than running BASIC programs has several advantages. The first relates to the learning experience. Unlike executing BASIC programs developed for them, students must understand the solution method if they are to generate a spreadsheet to solve a problem. Since electronic spreadsheet software is used much more frequently by practicing accountants than are BASIC language programs, the students are able to develop their skills with this popular software. With SuperCalc[3], students use only a few additional keystrokes to produce graphs that are particularly valuable for time-series analysis and forecasting.

The Auditing Standards Board's recent SAS on "Financial Forecasts and Projections" may increase the interest in including the study of forecasting techniques in the accounting curriculum. Accounting texts invariably ignore forecasting, while quantitative methods texts often devote only a single chapter to it. Texts entirely devoted to forecasting, such as the one by Makridakis, Wheelwright, and McGee (over 900 pages), generally require a full semester of study. The textbook and software reviewed here provide the instructor with an opportunity to include forecasting topics in his or her course, while maintaining considerable flexibility over the other topics of the course.

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GAYLORD N. SMITH, *Electronic Spreadsheet Applications for Cost Accounting, Lotus 1-2-3/IBM PC* (Cincinnati: South-Western Publishing Co., 1985, pp. vii, 152, $19.95 paper including template).

Introduction of computer applications into accounting courses necessitates diverting valuable instructional time to teaching students software as well as allowing time for the sometimes repetitious task of designing and programming worksheets. Publishers respond to this difficulty by providing templates that often are sterile and can result in students learning not concepts, but skills in plugging numbers into blanks. Using this text as a supplement to cost-managerial texts mitigates these problems and allows the instructor to effectively integrate computers into the classroom in a time-efficient manner.

A tutorial is clearly written, with data presentation well paced so that students easily follow the "hands on" procedures. A pre-programmed section, containing problems for which data and a partially programmed solution are already entered onto a template, gives students experience in developing and entering formulas for each program. "Template Ticklers" require students to prepare additional, often challenging, alterations to the template. A disadvantage of the preprogrammed problems is that most are specific to the data given and require adjustments to become generalizable for solving other homework problems in the area.

A final section, containing model-building problems, gives students experience in designing complete programs. Although these programs are generalizable and help develop Lotus 1-2-3 skills, time constraints allow assigning only one or two per quarter.

In summary, this text provides a compromise between the time-consuming "design each program totally" approach and the simplistic template approach. The tutorial guides the students simply and succinctly through the basics of Lotus 1-2-3, the preprogrammed section provides comprehension of the principles of computer applications without losing time entering titles and column widths, and the model-building section helps students visualize the total application.

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JOHN WANLASS, *Computer Resource Guide: Principles of Accounting* (San Diego: Harcourt Brace Jovanovich, Publishers, 1984, pp. vi, 42, $19.95 paper including 2 disks).

This is a general ledger package that is available to students at a moderate price. Since it is not a practice set, it gives students a "real-life" feel as they work through problems. It requires no prior computer training and can be learned in a matter of minutes.

Just six pages of instruction prepares the student to use the package. An additional 23 pages provides an in-depth understanding of the program, but these need not be studied to use the program effectively. The package can be used on both the IBM-PC and Apple II + or IIe machines and each packet contains disks for both systems. The IBM version requires a two-disk system. It cannot be used on a hard disk or a network.

The instruction manual is well written and easy to understand. The manual includes the printout for a completed problem that the student can use to learn the system and gain confidence by immediately comparing his/her output with the correct solution. It also includes 11 additional problems that can be used for assignment material. One of those covers six months of activity, and the student is asked to prepare financial statements at the end of each of those months. As a general ledger program, it can be used on any problem in any textbook that requires the preparation of financial statements. The disk stores approximately 160,000 bytes of information, so all 12 of the problems in the manual plus several additional problems could easily be put on the disk. The data must be maintained on the program disk.

The program was designed specifically to be used in the first introductory accounting course. But for several reasons it might be more adaptable to the first intermediate accounting course. A reason for this is that many schools simply do not have the hardware to handle the large numbers of introductory accounting students. From an educational perspective, students are more prepared to be introduced to a computerized accounting system after they have completed introductory accounting. Also at the intermediate level, it can be used early in the course when computers are more available than later in the term.

The student inputs the company name, sets up the chart of accounts and the classification of accounts, and inputs the transactions. The computer will post the inputs and prepare financial statements as directed by the student. But the program has two frustrating aspects. It will not allow any change in the company name after it is initially entered; and after accounts are entered, they cannot be deleted, they can only be changed.

These frustrating aspects have a positive side since they help to deal effectively with the problem of student integrity. When students first initialize the disk, they do so by entering their name. This cannot be changed at a later date. Thus all printouts from a disk will bear that student's name.

The main strength of this product over its competitors is that it is a general ledger package rather than a practice set. As such it is a far superior tool for teaching students the "real-life" aspects of accounting.

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#310 THE UNIVERSITY OF CALIFORNIA AT LOS ANGELES. Applications are invited for positions in accounting at both the junior and senior levels for appointments beginning on July 1, 1987. A Ph.D. degree is required and the candidate must exhibit outstanding research capability. Resumés should be sent to Professor Wayne Landsman, Graduate School of Management, University of California, Los Angeles, CA 90024. Telephone: 213-825-3930. UCLA is an Affirmative Action, Equal Opportunity Employer.

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#312 FACULTÉ DES SCIENCES DE L'ADMINISTRATION, UNIVERSITÉ LAVAL. La Faculté des sciences de l'administration de l'Université Laval invite les personnes intéressées à enseigner au niveau des trois cycles universitaires et à faire de la recherche, à soumettre leur candidature. Cet enseignement et cette recherche pourraient être reliés a l'une des disciplines suivantes: Comptabilité, Finance et assurance, Management, Marketing, Systèmes d'information, Economie appliquée à la gestion, Systèmes de décision et de la Gestion de opérations. Nous offrons des postes aux rangs d'adjoint, d'agrégé ou de titulaire. Les personnes intéressées doivent détenir un doctorat ou être sur le point de l'obtenir. Les conditions d'emploi sont régies par la convention collective en vigueur. Les dates d'entrée en fonction sont pour l'automne 1986 ou l'hiver 1987. S'il vous plaît, faire parvenir votre curriculum vitae a: Monsieur Jean-Marc Martel, Vice-doyen académique, Faculté des sciences de l'administration, Université Laval, Québec G1K 7P4, Canada.

#313 CHAIRPERSON, THE UNIVERSITY OF TOLEDO. The Department of Accounting invites nominations and applications for the departmental chairperson. Candidates should possess a doctorate, preferably with accounting as a major area of study. Applicants should have established credentials sufficient to support a senior-level faculty appointment. Salary for the appointment is very competitive. The University of Toledo has an enrollment of approximately 20,000 students. The campus is located in an excellent neighborhood which enables many of the faculty to walk to their offices. The Accounting Department offers an undergraduate degree in accounting as well as a Master of Science in Accounting degree and the MBA. Send vita to: Dr. Larry F. Konrath, Chairman, Department of Accounting, The University of Toledo, Toledo, OH 43606. The University of Toledo is an Equal Opportunity/Affirmative Action Employer.

#314 THE UNIVERSITY OF TOLEDO. The Department of Accounting invites applications for positions effective September 1986 or January 1987. Candidates should possess a doctorate with a specialty in accounting. ABD's will also be considered. Salary for the appointment is very competitive. The University of Toledo has an enrollment of approximately 20,000 students. The campus is located in an excellent neighborbood which enables many of the faculty to walk to their offices. The Accounting Department offers an undergraduate degree in accounting, as well as a Master of Science in Accounting degree and the MBA. Send vita to: Dr. Larry Konrath, Chairman, Department of Accounting, The University of Toledo, Toledo, OH 43606. The University of Toledo is an Equal Opportunity/Affirmative Action Employer.

#315 POSITION WANTED. Just retired, age 60, after 14 years university teaching in Singapore. M.A., F.C.A. (England and Wales). Extensive previous experience as practitioner in England. Seeking visiting professorship or one-year appointment to teach financial accounting. Any location. Available any time. Please write for resumé to: Peter Windle, 29 Garlick Avenue, Singapore 1027, Republic of Singapore.

#316 CHAIRPERSON, DEPARTMENT OF ACCOUNTING AT EAST CAROLINA UNIVERSITY. Applications are invited for the position of chairperson of the Accounting Department in the School of Business, one of five departments in the school, with twelve faculty. The School of Business has AACSB accreditation at both the graduate and undergraduate levels. Candidates must possess an earned doctorate with major or concentration in accounting and have a record of outstanding teaching, administrative competency, and recent scholarly publications. Professional certification and some professional accounting experience are highly desirable. Salary competitive. Send application, resumé, and three references before October 31, 1986 to: Dr. Philip C. Cheng, Chair Search Committee, School of Business, East Carolina University, Greenville, NC 278[illegible]4. East Carolina University, a constituent institution of the University of North Carolina System, is an equal opportunity, affirmative action employer.

#317 THE UNIVERSITÉ DU QUÉBEC À MONTRÉAL invites applicants for tenure-track positions in Accounting at the Assistant Professor level. Candidates should possess a doctorate, preferably with accounting as a major area of study. Doctoral candidates at advanced dissertation stage will be seriously considered. Fluent speaking abilities in French are required for teaching purposes. Teaching experience and published research are desirable. Duties include teaching, research, and administrative services. The Accounting Department offers two undergraduate degrees in accounting, as well as a Master of Science in Accounting program. Applicants can choose to teach in any of the following areas: Financial Accounting, Managerial Accounting, Auditing and Taxation (Canadian tax laws). Salary is based upon credentials and experience. Applications should be sent to: Réjean Belzile, Département des sciences comptables, Université du Québec à Montréal, C.P. 8888, Succursale "A", Montréal, Québec H3C 3P8.

#318 CHAIRPERSON—Accounting Department, School of Business Administration, Oakland University, Rochester, Michigan (suburban Detroit). Candidates must provide leadership in academic and research programs and interact with the business and professional community. Rank and salary open and extremely competitive; outstanding fringe benefits. Candidates should be tenurable and possess a doctoral degree in accounting. Send resumés to: Ronald M. Horwitz, Dean, School of Business Administration, Oakland University, Rochester, Michigan 48063. Oakland University is an Equal Opportunity, Affirmative Action Employer.

#319 SANTA CLARA UNIVERSITY invites applications for tenure-track positions in Accounting. The qualifications for these positions are a demonstrated interest in and capacity to do publishable research and a high level of teaching competence. A Ph.D. in Accounting is required (ABDs nearing completion of the dissertation will be considered). The University is an Equal Opportunity/ Affirmative Action Employer. Send resumé and list of references to Charles F. Louie, Accounting Department, Santa Clara University, Santa Clara, CA 95053.

#320 SOUTHERN METHODIST UNIVERSITY has an opening for an Assistant Professor of Accounting. Position begins Fall semester 1986. Earned doctorate or ABD. Research and teaching emphasized for tenure and promotion. Salary negotiable based upon experience and prior research record. Direct inquiries (including vita) to: Chairperson, Department of Accounting, Edwin L. Cox School of Business, Southern Methodist University, Dallas, Texas 75275. Southern Methodist University is an Equal Opportunity/Affirmative Action/Title IX Employer.

#321 DEPARTMENT HEAD. The Department of Accounting at The University of Akron is seeking a department head, appointment effective by September 1, 1987. Recently described in *Forbes Magazine* as a "thriving" city experiencing "a renaissance," Akron is a cosmopolitan, diversified, service-oriented community located in a major metropolitan area. The University of Akron, third largest in the state of Ohio, has a total day and evening enrollment of 26,000 students; 800 accounting majors; and approximately 250 accounting graduates each year. The Department has 27 tenured or tenure-track faculty, 19 of whom have doctorates. It offers an MS in accounting, an accounting concentration in the MBA program, a Master of Taxation, and a joint JD/Master of Taxation Program. Undergraduate and graduate programs in business administration are AACSB accredited. Qualified applicants should possess an earned doctorate; professional certification is desirable. Applicants should qualify for appointment as associate or full professor. Demonstrated dedication to teaching excellence, research, and professional activities is essential. Rank and salary are competitive and negotiable. Send resumés to Professor R. Penny Marquette, Chair, Search Committee, Department of Accounting, College of Business, Box 1040, The University of Akron, Akron, Ohio 44325, before October 15, 1986. The University of Akron is an equal opportunity/ affirmative action employer.

#322 OLD DOMINION UNIVERSITY—ACCOUNTING. Anticipated tenure-track assistant professor position for August 1987. Terminal degree is required but ABD with substantial progress will be considered. ODU, located in Norfolk, Virginia, is a state-supported doctoral degree granting university with AACSB accreditation at both graduate and undergraduate levels. Separate accounting accreditation has also been obtained. The School of Business Administration offers undergraduate programs in six areas and three graduate programs. Send applications by December 15, 1986 to: Dr. Richard Bebee, Chair, Department of Accounting, Old Dominion University, Norfolk, VA 23508. Telephone (804) 440-3529. Old Dominion University is an affirmative action, equal opportunity institution.

#323 THE UNIVERSITY OF DELAWARE, Department of Accounting, is recruiting faculty for September 1986 and September 1987. Emphasis in systems, managerial and financial accounting preferred, but other qualified faculty with interests in other accounting areas will also be considered. A Ph.D. or DBA in Accounting is required. The nine-hour normal load generally consists of three sections with two preparations. The teaching assignments are selected according to the individual's interests and qualifications. The Department offers an M.S. in Accounting (fifth year), in addition to a strong undergraduate accounting program. Teaching and course development will be expected at both graduate and undergraduate levels. Undergraduate program accredited by AACSB. The University of Delaware is located in a suburban/rural setting about midway between New York City and Washington, DC. The University of Delaware is an equal opportunity employer which encourages applications from qualified minority groups and women. The University is financially stable. Please contact Chairperson, Department of Accounting, University of Delaware, Newark, DE 19716 (phone 302-451-2961).

#324 ACCOUNTING TENURE-TRACK POSITION: Ph.D. (or dissertation in process) for assistant or associate professor for fall 1987. Sooner if desirable on part of candidate. Salary competitive. LeMoyne College has a very competitive student body of 1800 of whom ⅔ are residents. In addition to Accounting with 300 majors, it features curriculum with majors in traditional liberal arts areas as well as separate departments in Business Administration and Industrial Relations. It is located in Syracuse, New York, a major metropolitan area with a diversified industrial base, ready access to the recreational areas of the Finger Lakes and Adirondacks and one of the lowest costs-of-living among major cities. Send curriculum vitae to Dr. Ronald L. Taylor, Chair, Accounting Department, Le Moyne College, Syracuse, New York 13214. EEO/AA employer. (315) 445-4431.

#325 POSITION WANTED: B.S. (Accounting); J.D.; L.L.M. (Taxation); S.J.D. CPA and member of the Bar. Now in fifteenth year teaching in business programs in Europe—undergraduate and graduate programs. Courses include several of accounting, other business administration offerings and internationally oriented courses, e.g., International Business, International Accounting, etc. Also in Europe previously affiliated with U.S. subsidiaries at managerial level, Big 8 firms and law firm. Seeking position with business school in the USA, undergraduate or graduate. Please write to FRP, c/o Franklin Residence, No. 22, 666 Bloomfield Avenue, West Caldwell, NJ 07006 prior to July 25 and thereafter to FRP, Scala D, Interno 6, Via C. Pascarella, 00153 Rome, Italy.

#326 DEPARTMENTAL CHAIR: WRIGHT STATE UNIVERSITY is seeking a chair for the Department of Accountancy starting July 1987. Candidate must have doctorate and be qualified for appointment as an Associate/Full Professor. The chair provides leadership to 12 full-time faculty and should have a proven record of excellence in teaching, research and service. The candidate must be willing and able to maintain a strong relationship with the professional community and should have a professional certification. The College offers a BS with an Accounting Major and an MBA with an Accounting Concentration. Salary is competitive and is dependent on credentials and experience. Candidates should send a resumé to Professor Michael J. Cleary, Chair, Accounting Chairperson Search Committee, College of Business and Administration, Wright State University, Dayton, Ohio 45435. Applications received by August 15, 1986 will allow an opportunity for us to meet with potential candidates during the convention. Application deadline is December 1, 1986. Wright State University is an Equal Opportunity, Affirmative Action Employer.

#327 THE NORWEGIAN SCHOOL OF ECONOMICS AND BUSINESS ADMINISTRATION, Bergen, Norway, invites applications for position(s) in auditing. The School, which is a leading institution of its kind in Scandinavia, has a Professional Accounting and Auditing Program and directs the national CPA exams. Most textbooks in use are in the English language, and teaching may be conducted in English. Applicants must be committed to teaching. Permanent as well as visiting appointments will be considered. The School may cover moving expenses. Applications or requests for further information should be directed to Professor Frøystein Gjesdal, Chairman, Department of Accounting and Auditing, Norwegian School of Economics and Business Administration, Helleveien 30, N-5035 Bergen-Sandviken, Norway (phone (05) 25-65-00, (05) 25-64-60). Applications for permanent appointments must be submitted before October 1, 1986.

#328 ASSOCIATE PROFESSOR (TAXATION) at a major private institution with respected Master of Taxation program seeks visiting professorship for 1987–1988 AND/OR summer teaching for any summer session after 1986. Coastal or resort areas preferred for summer. Areas of expertise are Partnership, Estate, Gift and Fiduciary Taxation. Three years "Big Eight" experience and twelve years teaching experience. Please write for vita.

#329 THE UNIVERSITY OF HAWAII'S SCHOOL OF ACCOUNTANCY invites applications for faculty positions at the rank of assistant or associate. Candidates should be profession and research oriented. The College of Business is AACSB-accredited. Members of the School will be in attendance at NYC. Send resumé to: Dr. Wayne A. Label, Director, School of Accountancy, College of Business Administration, University of Hawaii, Honolulu, Hawaii 96822. The University of Hawaii is an Equal Opportunity/Affirmative Action Employer.

#330 THE UNIVERSITY OF SAN DIEGO, School of Business, is seeking applications for tenure-track appointments at the Assistant or Associate Professor levels. All teaching areas are available in the undergraduate and MBA programs with special needs in (1) auditing, (2) financial, and (3) managerial. The university numbers 5,000 students and the School of Business is AACSB-accredited. Ph.D. or DBA required. ABD also considered. If you think that a small, quality-oriented school where your input counts is where you would like to be, we would like to talk with you at the national AAA meeting in New York. Please contact Jim Daniels, School of Business, University of San Diego, San Diego, CA 92110. (619) 260-4875.

#331 THE UNIVERSITY OF MISSOURI-COLUMBIA, School of Accountancy, College of Business and Public Administration, has a tenure-track faculty position available for Fall 1987. The University is an Equal Opportunity, Affirmative Action Employer. Applications from minority members and women are encouraged for these positions. A Ph.D. or near completion is required. An interest in a mix of research, quality teaching, and service is preferred. Please send vita to: Dr. Thomas P. Howard, Chair, Accountancy Recruiting Committee, University of Missouri-Columbia, 230 Middlebush Hall, Columbia, Missouri 65211.

#332 THE UNIVERSITY OF MINNESOTA, DULUTH, SCHOOL OF BUSINESS AND ECONOMICS announces the following tenure-track positions (or may be tenured if hired at the professor rank): Instructor/Assistant Professor or Associate Professor/Professor of Accounting. Doctoral degree in accounting is required, or near completion. Teach cost/managerial, all levels of financial accounting, and selected electives in accounting. Applicants for these positions must have potential for successful contribution in teaching, publications, and service. Associate Professor level requires a record of successful college teaching, publications, and service. Professor level requires superior academic performance and national recognition. Starting date: September 1, 1987 or thereafter. Applications consisting of a curriculum vitae, the names of three references, and a letter expressing interest and availability should be sent by October 31, 1986 to: Dr. C. Stevenson Rowley, Head; Department of Accounting, 125 SBE; University of Minnesota, Duluth; Duluth, MN 55812. The University of Minnesota is an Equal Opportunity Educator and Employer and specifically invites and encourages applications from women and minorities.

#333 THE UNIVERSITY OF ARKANSAS will interview applicants at the AAA meeting in New York City for tenure-track positions at the assistant or associate professor level beginning Summer or Fall 1987. We are interested in adding faculty who are qualified and motivated to engage in research that leads to publication. The faculty member must also be a good teacher. A Ph.D./DBA or doctoral dissertation stage is required. The College of Business Administration and the Department of Accounting have accreditation for both the undergraduate and graduate programs, and the College administers the only Ph.D. program in the state. To arrange an interview in New York City, send a resumé to Dr. Jackson A. White, Department of Accounting, University of Arkansas, Fayetteville, AR 72701. Telephone: 501-575-4051.

#334 UNIVERSITY OF LOUISVILLE—ASSISTANT PROFESSOR OF ACCOUNTING. Appointments as Assistant Professor of Accounting will be available in the Department of Accountancy for Fall 1987. Minimum qualifications are: A Ph.D. or DBA, demonstrated potential for teaching effectiveness and demonstrated potential for quality research capabilities. ABDs will be considered if substantial progress has been made on the dissertation. Beyond minimal qualifications, preference will be given for possession of CPA or CMA. Preferred areas of teaching and research are financial, managerial, and auditing. Deadline for application is September 15, 1986. If you wish to take advantage of this opportunity, send your vita to: Dr. Alan Attaway, Chairman, Department of Accountancy, School of Business, University of Louisville, Louisville, Kentucky 40292. An Equal Opportunity, Affirmative Action Employer.

#335 CHAIRPERSON: The Pennsylvania State University is seeking a Chairperson for its Department of Accounting and Management Information Systems to begin July 1, 1987. The responsibilities are to: Enhance external relations with business and governmental communities; maintain internal relations with other academic units in the university; support active and diversified research programs of the department's faculty; and continually refine curriculum offerings for Ph.D., master's, and baccalaureate degree programs. Candidates should possess a record that demonstrates a commitment to research and higher education, a strong desire to continue to build the Department and College's reputation of national prominence. A doctorate and/or significant experience at a senior executive level in business are essential. Send resumé and references to Dr. Mark W. Dirsmith, Chairman, Search Committee, Business Administration Building, University Park, PA 16802.

#336 TULANE UNIVERSITY, A. B. Freeman School of Business, is seeking a research-oriented faculty member in financial accounting to fill a tenure-track position at the level of assistant professor. Salary and benefits are competitive at the highest levels. Please contact Dr. Soliman Y. Soliman, Accounting Group Coordinator, A. B. Freeman School, Tulane University, New Orleans, LA 70118, telephone (504) 865-5401. An Equal Opportunity/Affirmative Action Employer.

#337 PRAIRIE VIEW A&M UNIVERSITY has an opening for Head, Department of Accounting. Starting date is negotiable. Qualifications are as follows: Candidates must possess an earned doctorate in the appropriate field and be familiar with the academic areas that comprise the department. Candidates should have evidence of a strong post-doctoral record of teaching and scholarly research; demonstrated business accomplishments; evidence of leadership and administrative ability as well as professional activities appropriate for an appointment at the Associate or Full Professor rank. In addition, the successful candidates should be capable of developing strong relationships between the department and the business community. Salary is competitive and commensurate with qualifications. Send letter of application/nomination, resumé, official transcripts and three current letters of recommendation to Mr. Willie G. Webb, Chair, Search Committee, Department of Accounting, College of Business, Prairie View A&M University, P.O. Box 2294, Prairie View, TX 77446, (409) 857-4011. Closing date for applications: August 1, 1986 or until filled. FACULTY POSITIONS are also open, starting date negotiable. The positions require doctorate or ABD, teaching experience preferred, CPA desirable. Salary competitive and rank open for the positions. Send letter of application/nomination, resumé, official transcripts, and three letters of recommendation to Dr. Milton R. Bryant, Dean, College of Business, Prairie View A&M University, Prairie View, TX 77446. Prairie View A&M University is a part of the Texas A&M system and an Equal Opportunity Employer.

#338 TAXATION/LAW POSITION WANTED for Fall 1986 or Spring 1987. Several years teaching tax and business law experience. Also four years Big Eight tax experience. Attending AAA convention in New York. Write for resumé.

As we go into our tenth year, we would like to thank our authors in accounting, auditing and taxation for their outstanding contributions to our 1985-1986 publications.

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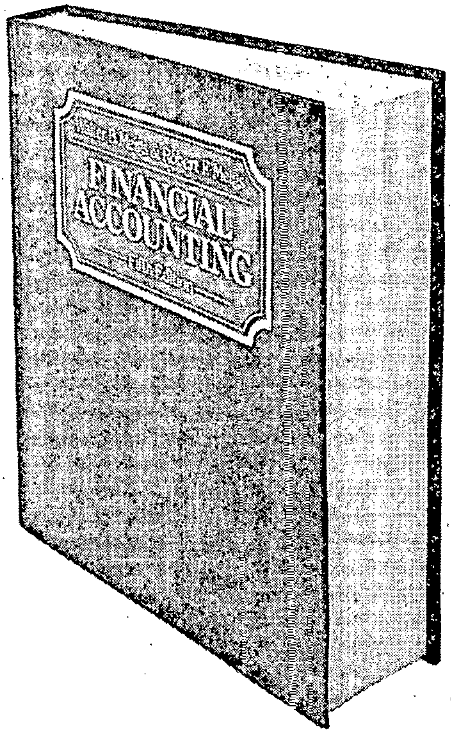

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Applications and nominations are invited for the position of Chairperson, Department of Accountancy. Candidates should have the doctorate in accounting and be qualified for appointment at a senior rank. The Chair is expected to provide leadership to a 27-person department faculty. Administrative responsibilities include program development, faculty recruitment and evaluation, supporting research, and fostering relationships with the profession. Degrees offered include the B.S. and the M.S. in Accountancy as well as the MBA with a concentration in Accountancy.

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Please submit resumes to:
Dr. Clifford D. Brown, Search Committee Chair, Department of Accountancy
Bentley College, Waltham, MA 02254

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FELLOWSHIP AWARD WINNERS

The American Accounting Association's Student Fellowships Committee met in New Orleans on April 10, 1986 to select the 1986-87 recipients of the American Accounting Association grants. The committee was chaired by Jose A. Gonzalez, Kent State University. Other members of the committee were James W. Deitrick, University of Texas, Austin, and Tonya K. Flesher, University of Mississippi. The Fellowships Committee was authorized to grant up to three awards in the amount of $5,000 to outstanding applicants based only upon academic merits. Other awards, in the amount of $1,000, were also made. The committee selections were based upon the applicants' attributes and accomplishments and were made without distinction as to the school at which the applicant would pursue the doctoral studies. The committee reviewed forty-one applications and granted awards totaling $30,000 to eighteen applicants. There were three $5,000 awards and fifteen $1,000 awards. The Fellowship Award winners were:

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Douglas K. Barney
Susan Bass Bennett
Philip Gary Berger
Robert D. Brown
John Brozovsky
Anthony F. Cocco, Jr.
John W. Gill
John Douglas Hanna
Eric Hirst
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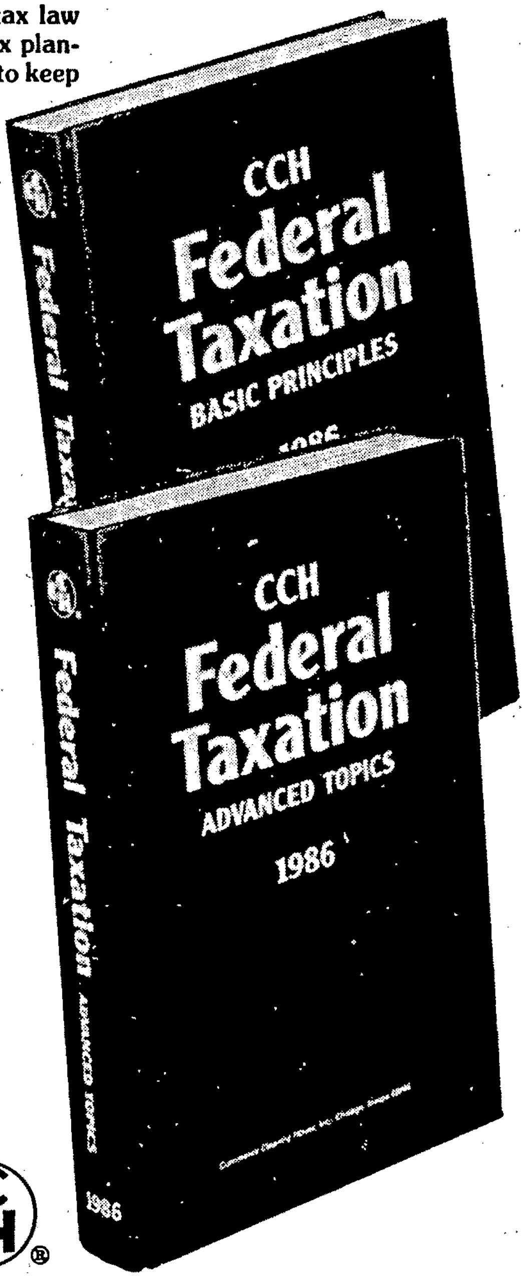

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Budgetary Participation, Motivation, and Managerial Performance

Peter Brownell and Morris McInnes

ABSTRACT: This paper reports the results of an empirical study designed to assess the relationship of budgetary participation to motivation and performance among middle-level managers in three manufacturing firms. Expectancy theory provides the theoretical framework for specifying and estimating motivation. It is hypothesized that motivation mediates the effect of participation on performance. Participation and performance are found to be significantly positively related; however, the path between them through motivation explains very little of this, principally because participation's relationship with motivation is insignificant. The correlations between participation and the elements in the expectancy model show a positive relationship with the expectancies, counteracted by a negative relationship with the intrinsic valences. An interpretation of participation's potential effects on budgetary slack is offered as a possible explanation of this unexpected finding.

EARLY theoretical literature in management accounting proposed that budgetary participation, through a positive effect on motivation, would enhance managerial performance (e.g., Argyris [1952]; Becker and Green [1962]). This idea is widespread, appearing in many popular texts (e.g., Welsch [1976, p. 31]; Shillinglaw and Meyer [1983, pp. 816–817]; Moriarty and Allen [1984, pp. 296–297]). Strangely enough, to this point the proposition has not been directly tested.

This paper reports the findings of an empirical study of the linkages between participation, motivation, and performance. The research framework is illustrated in Figure 1. The participation-motivation linkage is given particular attention in the study. An expectancy model is used to measure motivation, which allows an analysis of the effects of participation on the elements embodied in the model. The reason for doing this is that, despite the conventional wisdom referred to in the introductory paragraph, research evidence does not unambiguously suggest a positve relationship between participation and motivation. While numerous studies have established a positive connection between motivation and performance (p_{32}), evidence regarding the relationship between participation and performance (p_{31}) is mixed; jointly, these results suggest a close examination of the first stage (p_{21}) of the intervening linkage between

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participation and performance through motivation.

The next section reviews the relevant literature and develops the theoretical expectations of the study. This is followed by sections describing the research and the results, respectively. A final section discusses the implications of the study's findings, its limitations, and avenues for further research.

PREVIOUS LITERATURE AND THEORETICAL DEVELOPMENT

This section is in three parts. The first and second parts discuss each of the intervening linkages, participation-motivation and motivation-performance. The third part addresses participation's relationship with performance.

Participation and Motivation

There have been several findings of a positive relationship between participation in budget settings and motivation [Hofstede, 1967; Searfoss and Monczka, 1973; Searfoss, 1976; Kenis, 1979; and Merchant, 1981]. However, there has been no consistency among these studies in the approach to measuring motivation, and none has used expectancy theory. Hofstede [1967], in his theoretical development, dealt at length with Vroom's [1964] expectancy model, but his measures bore little resemblance to the theory. He used four measures, two relating to the perceived relevance of the budget and two to the strength of positive feelings toward the budget. Searfoss and Monczka [1973] and Searfoss [1976] both used subordinates' ratings of their superiors' budget-related behavior to assess the superiors' motivation. Kenis [1979] and Merchant [1981] both used three-item instruments, in the former case developed by Hackman and Lawler [1971], and in the latter case by Hackman and Porter [1968].

An Expectancy Model: In this study the expectancy model developed by House [1971], and introduced to the accounting literature by Ronen and Livingstone [1975] (hereafter RL), is used to measure motivation. The model is as follows:

$$M = IV_b + P_1\Big[IV_a + \sum_{i=1}^{n} (P_{2i}EV_i)\Big], \quad (1)$$

$$i = 1, \ldots\ldots, n$$

where M = motivation,

IV_a = intrinsic valence associated with work-goal accomplishment,
IV_b = intrinsic valence associated with goal-directed behavior,
EV_i = extrinsic valence associated with the ith extrinsic reward contingent on work-goal accomplishment,
P_1 = the expectancy that goal-directed behavior will lead to work-goal accomplishment, and
P_{2i} = the expectancy that work-goal accomplishment will lead to the ith extrinsic reward.

The model posits M as the motivation, or drive, to engage in a particular behavior, namely goal-directed behavior. The magnitude of M, or the strength of the drive, is determined by the intrinsic valence, IV_b, attributed by the manager to goal-directed behavior, together with the expectations of, and valences attributed to, other outcomes which may result from the behavior. P_1 is interpreted as the expectancy that the behavior will result in work-goal accomplishment, that is to say, attaining the budget. The P_{2i} are a set of expectancies linking budget attainment to n extrinsic, or externally mediated, outcomes, having valence EV_i to the manager. Finally, IV_a is the internally mediated valence the manager attributes to budget attainment.

The effect of budgetary participation on each component of this model is now considered, addressing first the valences and then the expectancies. Participation's effect on the overall measure of motivation is then discussed.

Valences: Considering first the IV's, RL proposed that participation would create or enhance these "due to a tendency for individuals to become 'ego involved' in decisions to which they have contributed" [1975, p. 679]. They were not specific about whether this effect would operate on IV_a, IV_b, or both. However, we contend that participation's positive effect is more likely for IV_a than for IV_b.

In the case of IV_a, the personal sense of satisfaction and fulfillment resulting from achieving a participatively set goal suggests a strong positive relationship between participation and IV_a. In fact, much previous literature has relied on some variant of this argument in claiming positive effects of participation on motivation (e.g., Becker and Green [1962]). RL state that "presumably, the greater the subordinate's opportunity to influence the goal and exercise control, the more intrinsically valent is the work goal accomplishment" [1975, p. 673]. Thus, a positive relationship is hypothesized between participation and IV_a.

It is difficult to predict participation's effect on IV_b. Conceivably, participation might provide a manager with the opportunity to alter characteristics of the task to be performed, perhaps improving the inherent interest in the task. If so, job enrichment might result, which would suggest a positive relationship between participation and IV_b. Alternatively, an enhanced right of the organization to put negative sanctions on failure to achieve a participatively set goal, or a greater possibility of self-censure [Tiller, 1983], could introduce added stress to the goal-directed behavior. The satisfaction, and relief, inherent in the achievement of a participatively set goal (IV_a) seems clear; but whether a manager is likely to derive enhanced value from the behavior entailed in pursuing the goal (IV_b) is unclear.

Finally, there seems no reason to expect a consistent relationship between participation and the EV_i. It is difficult to make a case that the value placed by an individual on an extrinsic outcome (e.g., pay or bonus) should depend on whether a goal, the achievement of which is instrumental to the outcome, is participatively set.

In sum, it is hypothesized that positive effects of participation will be observed in the case of IV_a; this is designated H_1. The relationship between participation and IV_b is unclear, and no consistent relationship is expected with the EV_i.

Expectancies: Two independent scenarios with implications for P_1 can be suggested. First, the information exchange accompanying participation may increase the clarity of path-goal relationships for a manager [House, 1971], strengthening the belief that budget-directed behavior will lead to budget attainment. Second, the manager might, through the opportunity provided by participation, negotiate a budget which is easier to attain than would be set without participation.[1] Both effects would enhance P_1.

In the case of the P_{2i}, Becker and Green [1962, p. 401] say that a successful participative budget "provides information to associate reward or punishment with performance." This is a potential major benefit of participation to the organization, because a goal which is participatively set may become a firmer basis for administering rewards and sanctions. On the one hand, participation reduces the plausibility of an explanation of an inappropriate goal level should the manager fail to achieve budget, thereby enhancing the legitimacy of negative sanctions. But on the other hand, participation strengthens the organization's obligation to link rewards to budget achievement.

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[1] This is not to say that imposed budgets must inevitably be more demanding than participative budgets. For instance, a superior, uninformed by the communication which accompanies participation, could err on the side of an inappropriately low budget; and managers who are experiencing high levels of anxiety with regard to job security may, left to their own devices, set inappropriately high budgets [Lowe and Shaw, 1968]. However, the expectation of continual improvements in organizational performance manifests itself in "budget ratcheting" [Weitzman, 1980]. Hence, participation is normally expected to moderate the performance demands which would otherwise be incorporated in budgets [Hanson, 1966].

Regarding this last point, Brownell [1982] showed that heavy reliance on budgets in performance evaluation needs to be accompanied by high participation in budgeting to elicit a favorable effect on performance. Subsequently, based on the same empirical data as the present study, Brownell [1983] showed that a preoccupation of superiors with unfavorable budget variances adversely affects motivation unless the budget is participatively set. Together, these results suggest that, in the absence of participation, a heavy emphasis on budget-based evaluation is felt by managers to be illegitimate; however, participation without subsequent reference to the budget in evaluation is also viewed as being illegitimate.

In summary, it is predicted that participation is positively associated with both P_1 and the P_{2i}. These hypotheses are designated H_2 and H_3, respectively.

The Combined Effect: H_1, H_2, and H_3 all predict a positive effect of participation on components (IV_a, P_1, and the P_{2i}, respectively) of the expectancy model. Since participation's effects on the model's other components are indeterminate (IV_b) or neutral (EV_i), the overall effect on motivation is hypothesized to be positive. This is designated H_A.

Motivation and Performance

Some evidence of a positive relationship between motivation and performance is reported in the accounting literature [Ferris, 1977 and Rockness, 1977]. However, by far the majority of the evidence is found in the organizational behavior literature. There are several excellent reviews of this work, for example, Mitchell [1974, 1979], Wahba and House [1974], Connolly [1976], and Campbell and Pritchard [1976]. Mitchell [1979] concludes that most studies demonstrate a positive relationship between motivation and performance. This is hypothesized in the present study, designated H_B.

Participation and Performance

H_A and H_B together seem to suggest a positive relationship between participation and performance. Yet it is precisely the lack of clear evidence of such a relationship that motivates close examination of H_A, and the hypotheses, H_1 through H_3, addressing the expectancy theory elements. The results reported in the accounting literature pertaining to participation and performance range from a strong positive relationship [Merchant, 1981] to evidence of a negative relationship [Cherrington and Cherrington, 1973]. Locke and Schweiger [1979], based on a review of the literature in the organizational behavior area, conclude that there is no consistent evidence of a positive effect of participation on performance.

In the present study, any relationship that does exist between participation and performance is predicted to result from the joint operation of the propositions expressed in H_A and H_B; that is, it is by the intervening path through motivation that participation can affect performance. Stated more formally, it is hypothesized that any observed relationship between participation and performance will be attributable to the indirect effect of participation, operating through motivation, to affect performance. This hypothesis is designated H_C.

RESEARCH DESIGN

Data were collected by a questionnaire sent to 224 middle-level managers drawn from a variety of functional areas in three companies, two in the electronics industry and one in the steel industry. Two selection criteria were stipulated: first, control over costs should be an important element of the performance of the managers; and second, their costs should be budgeted and monitored. Sample selection was done by the top management of each company. Completed questionnaires were returned directly to the researchers without intervention of top management; response to the questionnaire was therefore volitional.

The questionnaire measured participation in budget setting, motivation, and performance. The measurement of each of these is now explained, followed by a description of the tests used to assess the hypotheses.

Budgetary Participation

The participation measures developed by Milani [1975] and by Hofstede [1967] were both used. The Milani measure is a six-item, Likert-type scale, each item calling for a response from one to seven. The scale is designed for additive construction of the overall score, and a previously performed factor analysis [Brownell, 1982] provided ample confirmation of the single factor nature of the measure. The Cronbach alpha reliability coefficient computed from its use in this study was 0.76. The Hofstede measure is an eight-point, single-choice scale, descriptively anchored at each point in the scale. The two measures are significantly correlated (0.59, $p<0.01$); however, they share only about a third of the combined variance of the measured participation, so the analysis is performed separately using each measure and both sets of results are reported.

Motivation

All the items in the model in equation (1) were measured in the questionnaire, and an overall score was calculated for each subject.

The measurement of the valences was adapted from the procedure developed by Lawler and Suttle [1973], and follows Brownell's [1983] method of distinguishing among the three categories of valence. Seventeen outcomes were used, classified as either intrinsic (eight outcomes) or extrinsic (nine outcomes). These are listed in the Appendix. Respondents were *twice* asked to indicate on a scale from one (extremely desirable) to nine (extremely undesirable) the strength of their preference for each outcome; once as each might result from "working hard" and again, elsewhere in the questionnaire, as each might arise from "meeting or beating budgeted goals." The intrinsic valence of budget-directed behavior (IV_b) was measured by averaging the scores given to the eight intrinsic items in the *first* set of responses, and of budget accomplishment (IV_a) by averaging the scores given to the same eight items in the *second* set of responses. The valences associated with the nine extrinsic outcomes (EV_i) were measured by the scores in the second set of responses, the valences associated with outcomes resulting from budget accomplishment. For ease of interpretation, the raw scores were reversed and rescaled by subtracting five from each one. Thus, positive scores indicate desired outcomes and negative scores undesired outcomes.

The nine P_{2i} values were assessed by asking respondents to indicate on a scale from one (never) to seven (always) how often "meeting or beating the budget" would result in each outcome. Three additional questionnaire items elicited measures of P_1. These were significantly correlated, and a single measure was derived by averaging the three. For convenience, the expectancies were converted to scores in the range of zero to one.

Performance

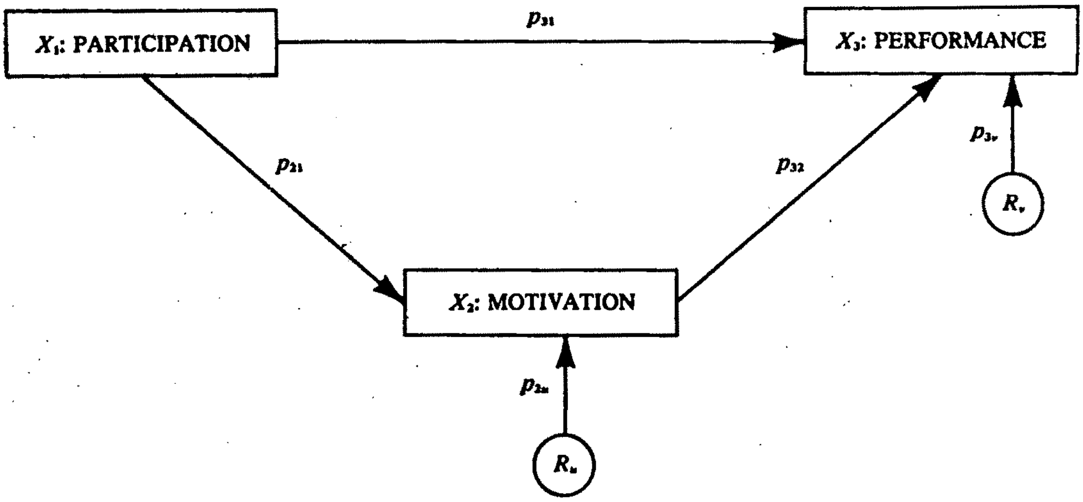
Anonymity was guaranteed to respondents to avoid possible bias in the data, making it necessary to measure performance by a self-rating method. In fact, Thornton [1980] advocates this approach to measuring performance in studies using a cognitive basis, such as expectancy, for measuring motivation. He comments: "Cognitions are an intervening variable between motivational force and objective performance, and should be studied" [p. 269]. Some have claimed that self-ratings of performance tend to exhibit a leniency bias compared with, say, superior ratings [Parker et al., 1959; Prien and Liske, 1962; and Heneman, 1974]; others, however, disagree with the claim [Nealey and Owen, 1970]. In the present study, even if leniency does exist, provided it is not systematic with participation or with elements of the expectancy model, the results will be unaffected. However, a "common-method" bias, inflating the participation-performance correlation, is clearly a possibility, although such a bias is unlikely in the case of motivation because of the complex and indirect method used in its measurement. Hence, the results may, if anything, be conservative in their assessment of the amount of the relationship between participation and performance attributable to the linkage through motivation.

The performance measure developed by Mahoney et al. [1963, 1965] was used in the study. This asks for ratings for each of eight dimensions of performance as follows: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing. It also asks for a single overall rating, bearing in mind that different managerial positions are likely to require different mixes of the eight dimensions. In their developmental work, Mahoney et al. [1963, pp. 106–107] indicated that the eight dimensions should be independent and should explain at least 55 percent of the overall rating (the remainder being explained by job-specific factors). These claims were tested. To assess dimensional independence, a rule of thumb suggested by Pindyck and Rubinfeld [1976, p. 68] was used. Multi-collinearity among independent variables is likely to be a concern if the sample correlation between two of the independent variables (the dimensions of performance) is larger than the correlation of either or both with the dependent variable (in this case, the separately elicited overall rating). Of 28 possible comparisons, only three violated this criterion, indicating that the eight dimensions are reasonably independent. To test the second claim, the overall rating was regressed on the eight sub-dimensions; the regression explained 78 percent of the variance in the overall rating. These results strengthen confidence in the validity and reliability of the single overall self-rating of performance, and this is used in the analysis as the measure of managerial performance.

Analysis

The hypothesized effects between participation and motivation (H_A), participation and the elements of the expectancy model (H_1 through H_3), and motivation and performance (H_B) are all

FIGURE 1
THE RESEARCH FRAMEWORK



tested simply by reference to the significance of the correlation coefficients between the respective variables. Path analysis is used to assess the linkage between participation and performance through motivation, and its contribution to the overall relationship observed between participation and performance (H_C).

The major benefit of path analysis is that it allows a decomposition of an observed relationship between two variables (in this case participation and performance) into the portion attributable to paths through one or more measured variables (in this case motivation) posited as intervening between the two, and the portion which results either from a direct relationship between the two variables or from paths through unobserved variables. In Figure 1, participation, the exogenous variable in the model, is denoted as X_1, motivation as X_2, and performance as X_3. The path coefficients in the model are denoted p_{ij}, and R_k denotes the unexplained portions of the endogenous variables, motivation and performance.

The equations to the structural model are as follows:

$$X_2 = p_{21}X_1 + p_{2u}R_u \quad (2)$$

$$X_3 = p_{31}X_1 + p_{32}X_2 + p_{3v}R_v \quad (3)$$

The solution of p_{21} can be assessed directly by computing the correlation coefficient r_{12}. A path coefficient between two variables equals the correlation between them in circumstances where a variable is dependent on a single cause and a residual. This is the case for X_2 (motivation) which, in the model, is dependent only on X_1 (participation).

Solutions for p_{32} and p_{31} are obtained using partial regression.[2] If, as above, it

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[2] There are a number of equivalent ways to obtain these solutions. A common approach [Stokes, 1974] is by means of an instrumental variables procedure. This involves multiplying equations by suitable instruments, taking expected values, and solving. Suitable instruments are variables contained in a particular equation which are uncorrelated with the residual variables of the equation. In equation (3), for example, X_1 and X_2 are suitable, but X_3 is not.

TABLE 1

CORRELATIONS BETWEEN PARTICIPATION AND IV_a, IV_b, P_1, AND MOTIVATION, AND BETWEEN MOTIVATION AND PERFORMANCE

		Measure of Participation	
Hypothesis	*Linkage*	*Hofstede*	*Milani*
H_1	Participation/IV_a	−0.158*	−0.093
—	Participation/IV_b	−0.171*	−0.102
H_2	Participation/P_1	0.212**	0.180*
H_A	Participation/motivation	0.113	0.139
H_B	Motivation/performance	0.248**	

* $p<0.10$
** $p<0.05$
These, and all subsequent probabilities, are based on a two-tailed test.

is assumed that the residuals are uncorrelated with the explanatory variables in their equations, and all variables are expressed in standard form, then the p_{ij} can be estimated by ordinary least squares procedures; they are in fact equal to the standardized partial regression coefficients. Equations (2) and (3) can be rewritten as follows:

$$X_2=\beta_{21}X_1+p_{2u}R_u \qquad (4)$$

$$X_3=\beta_{31.2}X_1+\beta_{32.1}X_2+p_{3v}R_v \qquad (5)$$

The residual path coefficients can be calculated using the general form:

$$p_{ie}=[(1-r_e^2)]^{1/2}$$

where r^2 is the square of the appropriate multiple correlation coefficient. In the present context:

$$p_{2u}=[(1-r_{12}^2])^{1/2} \qquad (6)$$

and

$$p_{3v}=[(1-r_{3.12}^2)]^{1/2} \qquad (7)$$

Finally, the decomposition of the total effect of one variable in the model on another is obtained using the computed path coefficients and the correlation coefficients:

$$r_{12}=p_{21} \qquad (8)$$

$$r_{13}=p_{31}+p_{32}r_{12} \qquad (9)$$

$$r_{23}=p_{32}+p_{31}r_{12} \qquad (10)$$

The second components on the right-hand side of equations (9) and (10) capture the indirect and spurious effects, respectively, while the first components, the path coefficients themselves, capture the direct effects in the model.[3] Equation (9) is central to the testing of H_C. The direct effect, p_{31}, is expected to be approximatley zero, while the indirect effect, $p_{32}r_{12}$, is expected to be approximately equal to r_{13}. In other words, the simple correlation between participation and performance is expected to be wholly accounted for by the indirect effect.

RESULTS

Of 224 questionnaires distributed, 140 were returned, a response rate of 62.5

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[3] This procedure is also used to test the suitability of more parsimonious models that exclude one or more linkages. In general, the assessment of suitability is based on whether the original matrix of intercorrelations among the variables in the model can be reproduced by a more parsimonious model. For elaboration, see Land [1969].

TABLE 2
CORRELATIONS BETWEEN PARTICIPATION AND THE EV_i AND P_{2i}

Outcome	$P_{2i}(H_3)$		EV_i	
i	*Hofstede*	*Milani*	*Hofstede*	*Milani*
1. Pay raise	0.168*	0.232**	−0.063	0.143
2. High pay	0.242**	0.196**	−0.161*	0.076
3. Respect from boss	0.067	−0.052	0.017	0.060
4. Respect from peers	−0.073	−0.049	−0.107	−0.141
5. More compliments	0.194**	−0.097	−0.024	−0.201**
6. Greater independence	0.196**	0.104	−0.045	−0.010
7. More chance to make friends	0.120	0.201**	−0.192**	−0.049
8. Special award	0.077	0.070	0.013	−0.024
9. Promotion	0.258**	0.192**	−0.050	0.128

* $p<0.10$
** $p<0.05$

percent.[4] Thirty-two returns were excluded because of incomplete responses.[5] The final sample size was therefore 108.[6,7]

Tables 1 and 2 report the correlation coefficients between participation and motivation, participation and the various elements of the expectancy model, and motivation and performance.

H_1 predicts a positive relationship between participation and IV_a. As shown in Table 1, both coefficients are in fact negative, and, for the Hofstede measure of participation, significant. Hence, H_1 is rejected. Moreover, participation and IV_b are negatively associated.

Further analysis was undertaken to explore these surprising results. Recall that in equation (1) the two *IV*s enter as single mean values, in each case the average of eight intrinsic valences. Participation was correlated with each of the 16 intrinsic valences. While none of the 16 correlations is significant, for the Hofstede participation measure, 14 are negative ($p<0.01$, using a binomial test), and for the Milani measure, 12 are negative ($p<0.05$). This demonstrates considerable consistency across the intrinsic valences of a negative association with participation.

No consistent relationship is expected between participation and the EV_i. However, the second two columns in Table 2 show that 12 of the 18 correlations are negative ($p<0.08$), and three are signifi-

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[4] There was no significant difference in response rate across the three companies.

[5] The mean values of the variables which could be constructed for these 32 returns were compared, using t-tests, with the mean values of their counterparts in the sample of 108. No significant differences were detected, suggesting that the exclusion of the incomplete returns did not introduce any bias.

[6] The mean values of participation, motivation, and performance were compared across the three companies using t-tests. Eight of the nine comparisons are insignificant. In addition, the correlation coefficients between the three variables in each company were compared for consistency with the coefficients in a pooled sample. Seven of the nine company coefficients are in the same direction as the corresponding pooled-sample coefficients; the two which differ in direction are not significantly different from zero. Where the pooled-sample coefficients are significant, three of the six company coefficients are also significant and in the same direction. Based on these results, a single pooled sample is used in the analysis.

[7] The difference in sample size between this study and the Brownell [1983] study arises from differences in the frequency of missing data across the different variables in the two studies.

TABLE 3
RESULTS OF THE PATH ANALYSIS (H_C)

Measure	*Coefficients*	*Value*	*Standard Error*	*t*	*p*
Hofstede	p_{31}	0.239	0.092	2.59	<0.05
	p_{32}	0.221	0.092	2.40	<0.05
Milani	p_{31}	0.341	0.089	3.81	<0.01
	p_{32}	0.201	0.089	2.25	<0.05

Hofstede: $R^2=0.118$; $F_{2,105}=7.01$; $p<0.01$; $p_{2u}=0.994$; $p_{3v}=0.939$
Milani: $R^2=0.176$; $F_{2,105}=11.20$; $p<0.01$; $p_{2u}=0.990$; $p_{3v}=0.908$

cant: the valences of more chances to make friends, receiving more compliments, and high pay are negatively associated with participation.

H_2 predicts a positive relationship between participation and P_1, the expectancy that goal-directed behavior will lead to budget attainment. As shown in Table 1, P_1 is significantly and positively correlated with both participation measures. H_3 predicts a positive relationship between participation and the P_{2i}, the expectancies of extrinsic outcomes following from budget attainment. The relevant results are reported in the first two columns of Table 2, and they bear out the hypothesis. All nine significant coefficients are positive, while none with a negative sign is significantly different from zero. Further, the three coefficients that are significant for both participation measures relate to outcomes concerning monetary rewards and promotion, outcomes which virtually every business organization builds into its formal reward structure. Thus, the evidence supports the interpretation that participation reinforces the expectation of formal rewards being based on budget attainment.

The results pertaining to H_A and H_B are reported in Table 1. Participation is positively but insignificantly correlated with motivation; hence, H_A is not supported. It seems that the enhanced expectancies are offset in the motivation model by a reduction in the valences. Finally, motivation is significantly and positively correlated with performance. This is consistent with H_B; moreover, it gives added confidence of the construct validity of the motivation and performance measures.

The results of the path analysis used to test H_C are reported in Tables 3 and 4, which should be examined in conjunction with Figure 1. As can be seen from Table 3, for both participation measures, but especially for the Milani measure, participation is significantly positively correlated with performance, and both path models are significant overall. However, Table 4 reports the decomposition of participation's effect on performance (X_1/X_3); using either measure, participation's indirect effect on performance through motivation is small, which does not support H_C. The first indication of this emerged, of course, when p_{21} (which is in fact simply r_{12}, the correlation coefficient between participation and motivation) was found to be insignificant.

DISCUSSION

In summary, the study fails to confirm

TABLE 4

DECOMPOSITION OF THE EFFECTS IN THE MODEL (H_C)

Measure	*Linkage*	*Direct* (=*p*)	*Indirect*	*Total* (=*r*)
Hofstede	Participation/motivation (X_1/X_2)	0.113	—	0.113
	Participation/performance (X_1/X_3)	0.239	0.025	0.264
	Motivation/performance (X_2/X_3)	0.221	0.027*	0.248
Milani	Participation/motivation (X_1/X_2)	0.139	—	0.139
	Participation/performance (X_1/X_3)	0.341	0.028	0.369
	Motivation/performance (X_2/X_3)	0.201	0.047*	0.248

* Strictly, these are interpreted as spurious effects since, within the model, the observed correlation between motivation and performance is inflated by the common antecedent of each, namely participation. The starred items capture the components due to the common antecedent.

that budgetary participation, through its effect on motivation, enhances managerial performance. The most important finding underlying this is the negative relationship between participation and the *IV*s in the expectancy model, where a positive relationship, at least for IV_a, was expected.

The challenge of working toward a budget and the satisfaction derived from its attainment may both depend on its perceived difficulty. If so, an easy budget would, as observed in the study, be consistent with an enhanced P_1 and diminished *IV*s. This was the second of two scenarios offered earlier to support the prediction of a positive effect of participation on P_1. Participation's strengthening of the expectancies of formal rewards based on budget attainment (the P_{2i}) provides a motive for negotiating an easy budget. Schiff and Lewin [1970] predict that if managers believe rewards are contingent on budget attainment, they are likely to perceive easier, or slack, budgets to be in their immediate best interests. Empirical evidence, consistent with this contention, has been reported by Lowe and Shaw [1968], Onsi [1973], and Collins [1978]. Hence, a possible interpretation of the study's findings is that managers negotiate slack budgets in response to participation's reinforcement of the expectation of formal rewards being based on attaining budget, in essence trading off expectations of intrinsic for extrinsic rewards.[8]

Nevertheless, a strong positive relationship is found in the study between participation and managerial performance. Since only a small portion of this is accounted for by the path through motivation, the question arises as to its cause. As noted previously, a "common-method" bias might lead to an overstatement of the relationship. A further possibility is that a direct effect exists, but with reverse causality; managers who perform well may be permitted greater participation in setting their budgets. Finally, and perhaps most plausible, other variables may operate in the manner hypothesized for motivation. Quite apart from its motivational effects, participation may lead to such things as the introduction of improvements, at the suggestion of the participating manager, to the organization's managerial process.

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[8] It may be stretching the interpretation, but it is interesting to note that the relationships between participation and the EV_i indicate that managers also "discount" the extrinsic rewards which flow from achieving a participatively set budget. Possibly the symbolic value of an extrinsic reward for budget achievement is diminished in the case of an easier budget.

This last possibility could be explored by examining a wider range of variables which might be affected by participation and which in turn might affect performance. But assessing the causal direction of the relationship would require a research design, such as a field experiment, that would support making causal inferences.

As well as its inability to determine causality, the study has other limitations. First, the sample was not selected randomly, and the effects of nonresponse cannot be ascertained. Second, the results may not be generalizable beyond the three companies in the study, or to different managerial levels within the companies. Finally, aspects of the form of the expectancy model used in the study have been criticized (e.g., Staw [1977]), and expectancy models have sometimes shown a rather weak relationship to effort and performance (e.g., Ferris [1977]), raising questions about their validity in empirical use.[9]

Despite these *caveats*, the results of the study challenge the conventional wisdom concerning participation's effect on performance via motivation. This has important implications for the theory and practice of budgetary control, and warrants further confirmation. Moreover, the indication of significant favorable effects of participation on managerial performance, which are not mediated by motivation, justifies further research.

APPENDIX

List of Outcomes

Extrinsic

1. Pay raise
2. High pay
3. Respect from boss
4. Respect from peers
5. More compliments
6. Greater independence
7. More chances to make friends
8. Special award
9. Promotion

Intrinsic

1. Personal growth and development
2. Setting higher standards for yourself
3. Giving help to other
4. Time at work passing fast
5. Feelings of security
6. Setting higher standards for others
7. Feelings of accomplishment
8. Feeling less tired at work

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[9] The expectancy model used in the study is a job-effort, rather than a behavioral choice, model (see Mitchell [1974]; Dillard and Jiambalvo [1979]). A job-effort model is considerably more parsimonious than the latter in terms of its data requirements. However, its use in the study assumes that personal differences among subjects which influence the formation of valences and expectancies are either insignificant, or randomly distributed with respect to participation and managerial performance.

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Radical Developments in Accounting Thought

Wai Fong Chua

ABSTRACT: Mainstream accounting is grounded in a common set of philosophical assumptions about knowledge, the empirical world, and the relationship between theory and practice. This particular world-view, with its emphasis on hypothetico-deductivism and technical control, possesses certain strengths but has restricted the range of problems studied and the use of research methods. By changing this set of assumptions, fundamentally different and potentially rich research insights are obtained. Two alternative world-views and their underlying assumptions are elucidated—the interpretive and the critical. The consequences of conducting research within these philosophical traditions are discussed via a comparison between accounting research that is conducted on the "same" problem but from two different perspectives. In addition, some of the difficulties associated with these alternative perspectives are briefly dealt with.

> The history of thought and culture is, as Hegel showed with great brilliance, a changing pattern of great liberating ideas which inevitably turn into suffocating straightjackets, and so stimulate their own destruction by new emancipatory, and at the same time, enslaving conceptions. The first step to understanding of men is the bringing to consciousness of the model or models that dominate and penetrate their thought and action. Like all attempts to make men aware of the categories in which they think, it is a difficult and sometimes painful activity, likely to produce deeply disquieting results. The second task is to analyse the model itself, and this commits the analyst to accepting or modifying or rejecting it and in the last case, to providing a more adequate one in its stead.
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> [Berlin, 1962, p. 19]

SINCE the late 1970s there have been signs of unease among academics about the state and development of accounting research. In 1977 the American Accounting Association's (AAA) Statement on Accounting Theory and Theory Acceptance concluded that there was no generally accepted theory of external reporting. Instead, there was a proliferation of paradigms that offered only limited guidance to policy makers. In addition, the Committee was pessimistic that a dominant consensus could

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be realized since, through their reading of Kuhn [1970], paradigm choice was ultimately a value-based decision between incompatible modes of scientific life. This view of accounting as a "multi-paradigm science" is shared by writers such as Belkaoui [1981].

Wells [1976], on the other hand, argues that at present accounting lacks a definitive paradigm or disciplinary matrix [Kuhn, 1970, p. 182]. According to the argument, an identifiable disciplinary matrix emerged in the 1940s and provided the basis for "normal science" activity. However, research in the 1960s and 1970s brought about criticisms of this matrix and led to the emergence of several "schools" of accounting that start from different axiomatic positions. As yet, none of these schools has formed the foundation of a new disciplinary matrix. Accounting, it appears, remains in the throes of a "scientific revolution."

While academics debate whether accounting is a "multi-paradigm" or "multi-school" discipline, they agree that dissension is rife. In addition to this lack of consensus in the academic arena, there are problems with the relationship between accounting theorizing and organizational practice. The 1977–78 "Schism" Committee of the AAA indicated that academics neither spoke the language nor saw the problems of practitioners. Similarly, Hopwood [1984a] and Burchell et al. [1980] argue that particular rationales have been imputed to accounting procedures, and these may be divorced from the actual roles that these procedures play in practice. More recently, Kaplan [1984] has chided academics for their preoccupation with esoteric economics and management science journals and their reluctance to "get involved in actual organizations and to muck around with messy data and relationships" [p. 415].

The accounting domain is thus (a) characterized by apparently irreconcilable cross-paradigmatic discussions and (b) hampered by some theories *about* practice that, in the main, are neither *of* nor informed *by* practice. Given the state of the discipline, this paper has a threefold purpose.

Contrary to the conclusion of the AAA Statement on Accounting Theory and Wells [1976], this paper argues that accounting research has been guided by a dominant, not divergent, set of assumptions. There has been one general scientific world-view, one primary disciplinary matrix. And accounting researchers, as a community of scientists, have shared and continue to share a constellation of beliefs, values, and techniques. These beliefs circumscribe definitions of "worthwhile problems" and "acceptable scientific evidence." To the extent that they are continually affirmed by fellow accounting researchers, they are often taken for granted and subconsciously applied. In this way, a common world-view may be obscured by apparently conflicting theories.

The first aim of this paper is to enable accounting researchers to self-reflect on the dominant assumptions that they share and, more importantly, the consequences of adopting this position. The mainstream world-view has produced benefits for the conduct of accounting research with its insistence on public, intersubjective tests and reliable empirical evidence. However, it has limited the type of problems studied, the use of research methods, and the possible research insights that could be obtained. Such limitations only become clear when they are exposed to the challenge of alternative world-views.

The second purpose of this paper is to introduce such alternative sets of assumptions, illustrate how they change both problem definition and solution, and offer research which is fundamentally different from that currently prevailing. Finally, this paper argues that not only are these alternative world-views different, they can potentially enrich and extend our understanding of accounting in practice, thus answering the recent calls for studying accounting numbers in the contexts in which they operate.

RECENT CLASSIFICATIONS OF ACCOUNTING PERSPECTIVES

To perceive commonality amidst theoretical diversity, one has to examine the philosophical (meta-theoretical) assumptions that theories share. In accounting, there have been several attempts to delineate these assumptions [Jensen, 1976; Watts and Zimmerman, 1978, 1979]. However, these efforts concentrate on only a few dimensions and have been ably and powerfully criticized [Christenson, 1983; Lowe, Puxty, and Laughlin, 1983].

Recently, more comprehensive dimensions have been proposed. For instance, Cooper [1983] and Hopper and Powell [1985] rely on the sociological work of Burrell and Morgan [1979] and classify accounting literature according to two main sets of assumptions: those about social science and about society. Social science assumptions include assumptions about the ontology of the social world (realism v. nominalism), epistemology (positivism v. anti-positivism), human nature (determinism v. voluntarism), and methodology (nomothetic v. ideographic). The assumption about society characterizes it as either orderly or subject to fundamental conflict. According to Burrell and Morgan [1979], these two sets of assumptions yield four paradigms —functionalist, interpretive, radical humanist, and radical structuralist. Particular accounting theories may then be classified using these four paradigms. (Hopper and Powell [1985] actually combine the two radical paradigms.)

The Burrell and Morgan framework, however, is not without its problems. A detailed discussion of these difficulties is found in Appendix 1. Briefly, these problems stem from: (a) their use of mutually exclusive dichotomies (determinism v. voluntarism); (b) their misreading of Kuhn as advocating irrational paradigm choice; (c) the latent relativism of truth and reason which their framework encourages; and (d) the dubious nature of the differences between the radical structuralist and humanist paradigms. In addition, transplanting an unmodified framework from sociology implies some equivalence between the two disciplines. In the absence of a detailed exposition of such commonalities and the problems cited above, it was decided not to adopt the Burrell and Morgan framework. Instead, accounting perspectives are differentiated with reference to underlying assumptions about knowledge, the empirical phenomena under study, and the relationship between theory and the practical world of human affairs.

A CLASSIFICATION OF ASSUMPTIONS

All human knowledge is a social artifact—it is a product of the constituting labor of people as they seek to produce and reproduce their existence and welfare [Habermas, 1978]. Knowledge is produced by people, for people, and is about people and their social and physical environment. Accounting is no different. Like other empirically-based discourses, it seeks to mediate the relationship between people, their needs, and their environment [Tinker, 1975; Lowe and Tinker, 1977]. And in a feedback relationship, accounting thought is itself changed as human beings, their environment, and their perception of their needs change. Given this mutually interactive coupling between knowledge and the human, physical world, the production of knowledge is circumscribed by man-made rules or beliefs[1] which define the domains of knowledge, empirical phenomena, and the relationship between the two. Collectively, these three sets of beliefs delineate a way of seeing and researching the world.

The first set of beliefs pertains to the notion of knowledge. These beliefs may be sub-divided into two related sets of epistemological and methodological assumptions. Epistemological assumptions decide what is to count as acceptable truth by specifying the criteria and process of assessing truth claims. For instance, an epistemological assumption might state that a theory is to be considered true if it is repeatedly not falsified by empirical events. Methodological assumptions indicate the research methods deemed appropriate for the gathering of valid evidence. For example, large-scale sample surveys or laboratory experiments that are "statistically sound" may be considered acceptable research methods. Clearly, both sets of assumptions are closely related. What is a "correct" research method will depend on how truth is defined.

Second, there are assumptions about the "object" of study. A variety of these exist, but the following concerns about ontology, human purpose, and societal relations have dominated much debate in the social sciences.[2] To begin, all empirical theories are rooted in an assumption about the very essence of the phenomena under study. Physical and social reality, for instance, may be presumed to exist in an objective plane which is external to an independent knower or scientist. Within this perspective, people may be viewed as identical to physical objects and be studied in the same manner. Alternatively, these beliefs could be criticized for reifying individuals and obscuring the role of human agency. People, it may be argued, cannot be treated as natural scientific objects because they are self-interpretive beings who create the structures around them (see Habermas [1978] and Winch [1958] for a discussion). Yet other ontological positions which attempt to dialectically relate this reification-voluntarism debate have also been advocated [Bhaskar, 1979]. Whichever position is adopted, the issue of ontology lies prior to and governs subsequent epistemological and methodological assumptions.

Social science is also based on models of human intention and rationality. Such models are necessary because all knowledge is intended to be purposive and is constituted by human needs and objectives. Economics and accounting, for instance, are based on assumptions about the information needs of people given limited access to resources. Hence, the use of constructs such as "economic men," "bounded rationality," "prefers maximum leisure," or "desires information about future dividends and cash flow."

Further, there are assumptions about how people relate to one another and to society as a whole. As Burrell and Morgan [1979] point out, every social theory makes assumptions about the nature of human society—is it, for example, full of conflict or essentially

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[1] The word "beliefs" is used to show the tentative, open, and historically-bound nature of such assumptions. As social and historical contexts change, so will these meta-theoretical rules. In turn, these "scientific revolutions" will materially affect people and their environment.

[2] For a discussion see Weeks [1973], Fay [1975], Bernstein [1976, 1983], Driggers [1977], Bhaskar [1979], Brown and Lyman [1978], Burrell and Morgan [1979], Habermas [1978], Van de Ven and Astley [1981], Astley and Van de Ven [1983], Gadamer [1975], Schutz [1967], and Winch [1958].

TABLE 1

A CLASSIFICATION OF ASSUMPTIONS

- *A. Beliefs About Knowledge*
  - Epistemological
  - Methodological
- *B. Beliefs About Physical and Social Reality*
  - Ontological
  - Human Intention and Rationality
  - Societal Order/Conflict
- *C. Relationship Between Theory and Practice*

stable and orderly? Are there irreconcilable tensions between different classes, or are such differences always effectively contained through a pluralistic distribution of resources?

Third, assumptions are made about the relationship between knowledge and the empirical world. What is the purpose of knowledge in the world of practice? How may it be employed to better people's welfare? Is it intended to emancipate people from suppression or to provide technical answers to pre-given goals? As Fay [1975] shows, theory may be related to practice in several ways, each representing a particular value position on the part of the scientist.

Table 1 summarizes these assumptions. The three general categories of beliefs about knowledge, the empirical world, and the relationship between the two are argued to comprehensively characterize a disciplinary matrix. However, the list of particular expressions of these general conditions is not exhaustive. That is, other important assumptions under the category "beliefs about the physical and social world" may emerge. These assumptions are not immutable, but historically specific. The assumptions above were chosen because they reflect dominant themes currently being debated in the social sciences. In addition, they discriminate well between the alternative disciplinary matrices now surfacing in accounting research. Using other dimensions such as different concepts of income, measurement, or value would not have highlighted the fundamental philosophical differences between these accounting perspectives. Also, these assumptions are not posed as mutually exclusive dichotomies. This is to encompass attempts to relate opposite ends of a spectrum of positions.

Finally, unlike the work of Burrell and Morgan,[3] this set of assumptions is used to assess the strengths and weaknesses of alternative perspectives in accounting. This paper is not an attempt to describe different world-views in a value-free, non-evaluatory language. Recent philosophical debate [Kuhn, 1970; Popper, 1972a; Feyerabend, 1975] has demonstrated the folly of the search for a permanent, neutral framework within which competing paradigms and theories may be evaluated. Neither recourse to deductive proof nor to inductive generalizations provides the foundation for rational paradigm choice, not even in the so-called hard sciences [Hesse, 1980].

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[3] This is a major difference between the use of the classification in this paper and the non-evaluative stance of Burrell and Morgan. In addition, the present classification does not use mutually exclusive dichotomies and does not claim to comprehensively categorize all social and accounting perspectives in a permanent classification. Because the assumptions about, for instance, societal order and human rationality are seen as context-dependent and changeable through time, the classification only attempts to identify current perspectives which are emerging. These differences have the following result: although the individual assumptions used for the classification appear similar to those of Burrell and Morgan (ontological, epistemological, methodological), the classification as a whole and its use differ in important respects. The apparent similarity arises because both frameworks attempt to summarize and assemble separate discussions in the social and philosophical disciplines such that the distinctive nature of a disciplinary matrix may be identified.

Abandoning this concept of rational choice, however, does not lead inevitably to irrationalism and relativism, which claim that there can be no rational comparison among different paradigms and forms of scientific conduct. A scientist is always obliged to give a rational account of what is right and wrong in the theory that is displaced and how an alternative is better. Of course, these arguments of truth and falsity may prove "wrong" in the course of time. The criteria for paradigm comparison and evaluation are essentially judgmental, open to change, and grounded in social and historical practices [Bernstein, 1983; Rorty, 1979]. The notion of what is scientific is always in the process of being hammered out and being formed. Human fallibility, however, is not synonymous with irrationalism, and researchers are not forced to be locked within the prison of their own framework. Alternative frameworks may be rationally compared [Bernstein, 1983] such that not only do we come to understand an incommensurable paradigm, but also our own prejudices.

MAINSTREAM ACCOUNTING THOUGHT—ASSUMPTIONS

Beliefs about Physical and Social Reality

Ontologically, mainstream accounting research is dominated by a belief in physical realism—the claim that there is a world of objective reality that exists independently of human beings and that has a determinate nature or essence that is knowable. Realism is closely allied to the distinction often made between the subject and the object. What is "out there" (object) is presumed to be independent of the knower (subject), and knowledge is achieved when a subject correctly mirrors and "discovers" this objective reality.

Because of this object-subject distinction, individuals, for example accounting researchers or their objects of study, are not characterized as sentient persons who construct the reality around them. People are not seen as active makers of their social reality. The object is not simultaneously the subject. Instead, people are analyzed as entities that may be passively described in objective ways (for example as information-processing mechanisms [Libby, 1975] or as possessing certain leadership or budgetary styles [Brownell, 1981; Hopwood, 1974]).

This ontological belief is reflected in accounting research as diverse as the contingency theory of management accounting [Govindarajan, 1984; Hayes, 1977; Khandwalla, 1972], multi-cue probability learning studies [Hoskins, 1983; Kessler and Ashton, 1981; Harrell, 1977; Libby, 1975], efficient capital markets research [Gonedes, 1974; Beaver and Dukes, 1973; Fama, 1970; Ball and Brown, 1968], and principal-agent literature [Baiman, 1982; Zimmerman, 1979; Demski and Feltham, 1978]. All these theories are put forward as attempts to discover a knowable, objective reality. This inference is based on the absence of any expressed doubt that the empirical phenomena that are observed or "discovered" could be a function of the researchers, their *a priori* assumptions, and their location in a specific socio-historical context. Thus, a stock market return is discussed as an objective fact that may be classified as normal or abnormal. Similarly, "competitive" environments, "sophisticated" management accounting techniques, "shirking," "adverse selection," and "response to feedback" are characterized as representations of an objective, external reality.

Beliefs about Knowledge

This prior assumption leads to a distinction between observations and the theoretical constructs used to represent this empirical reality. There is a world of observation that is separate from that of theory, and the former may be used to attest to the scientific validity of the latter. In philosophy, this belief in empirical testability has been expressed in two main ways: (a) in the positivist's belief that there exists a theory-independent set of observation statements that could be used to confirm or verify the truth of a theory [Hempel, 1966], and (b) in the Popperian argument that because observation statements are theory-dependent and fallible, scientific theories cannot be proved but may be falsified [Popper, 1972a, 1972b].

Accounting researchers believe in the empirical testability of scientific theories. Unfortunately, they draw on both notions of confirmation and falsifiability with considerable unawareness of the criticisms of both criteria [Popper, 1972a; Lakatos, 1970; Feyerabend, 1975] and of the differences between the two. Thus, Sterling [1979, pp. 39–41, pp. 213–218] refers to empirical testability with a quote from Hempel [1966]. But as Stamp [1981] points out, Sterling is also an advocate of Popper's thesis of falsifiability and invites attempts to falsify his arguments. Similarly, Chambers [1966, p. 33] writes that "the state of knowledge consists in what has not been falsified," but on p. 34 speaks of scientific theories which are able to account for the occurrence of the phenomena under study. These, and many other examples, do not accord with Popper's ideal of theories that specify what ought not to happen and scientists who seek to find those occurrences that refute their theories.

Finally, as Christenson [1983] shows, the philosophical position of the proponents of positive accounting is muddled at best—conforming neither to Friedman's instrumentalism nor to Popper's falsification criterion but apparently appealing to the discredited position of the early logical positivists. Abdel-khalik and Ajinkya [1979, p. 9] appear to fall into the same predicament with their one-line statement that "the researcher following the scientific method . . . verifies his/her hypotheses by empirical testing."

In summary, accounting researchers believe in a (confused) notion of empirical testability. Despite this lack of clarity as to whether theories are "verified" or "falsified," there is widespread acceptance of Hempel's [1965] hypothetico-deductive account of what constitutes a "scientific explanation."

Hempel argued that for an explanation to be considered scientific, it must have three components. First, it must incorporate one or more general principles or laws. Second, there must be some prior condition, which is usually an observation statement, and third, there must be a statement describing whatever is being explained. The explanation shows that the event to be explained follows from the general principles, given that the prior condition(s) also hold.

For example: *Premise 1 (Universal law)*: A competitive environment always leads to the use of more than one type of management accounting control. *Premise 2 (Prior Condition)*: Company A faces a competitive environment. Therefore: *Conclusion (Explanandum)*: Company A uses more than one type of management accounting control.

This hypothetico-deductive account of scientific explanation has two main consequences. First, it leads to the search for universal laws or principles from which lower-level hypotheses may be deduced. To explain an event is to present it as an instance of a universal law. Second, there is a tight linkage between explanation, prediction, and technical control. If an event is explained only when its occurrence can be deduced from certain premises, it follows that knowing the premises before the event happened would enable a prediction that it would happen. It would also enable steps to be taken to *control* the occurrence of the event. Indeed, the possibility of control and manipulation is a constitutive element of this image of scientific explanation.

The use of the hypothetico-deductive model of scientific explanation is the most consistent characteristic of extant accounting research. Abdel-khalik and Ajinkya [1979] and Mautz and Sharaf [1961] refer to it as *the scientific method*. Peasnell [1981], Hakansson [1973], Gonedes and Dopuch [1974], and Scapens [1982], through their reviews of financial and management accounting, illustrate that to do empirical research is to conduct it within a hypothetico-deductive mode. (Peasnell uses the phrase "hypothetico-positive.")

Related to hypothetico-deductivism, yet another common assumption is a ubiquitous search for universal regularities and causal relationships. The contingency approach in management accounting, the positive theory of agency [Fama and Jensen, 1982], and the transaction cost theory [Chandler and Daems, 1979; Johnson, 1980] seek general connections between the development of accounting systems, changing environmental conditions, and organizational forms. Generalizable relations are also sought in multi-cue probability learning studies (between individual responses and accounting numbers in the performance of specific tasks), efficient capital markets research (between accounting numbers and aggregate market responses), and principal-agent literature (between particular principal-agent contracting arrangements and the use of accounting techniques such as cost allocation or budgetary control). Indeed, so extensive is the search for generalizable relations that accounting researchers appear to believe that the empirical world is not only objective but is, in the main, characterized by knowable, constant relationships.

These related assumptions about "scientific" explanation have influenced the choice of research methods. Invariably, research reports are begun with a statement of hypotheses followed by a discussion of empirical data and concluded with an assessment of the extent to which the data "supported" or "confirmed" the hypothesis. In addition, data collection and analysis are focused on the "discovery" of rigorous, generalizable relations. Hence, there is a relative neglect of "soft" methods such as the case study [Hagg and Hedlund, 1979] and instead a widespread use of large samples, survey methods, experimental laboratory research designs, and statistical and mathematical methods of analysis.

Beliefs about the Social World

Mainstream accounting research makes two important assumptions about the social world. First, it is assumed that human behavior is purposive. Thus, although people may possess only bounded rationality [Simon, 1976], they are always capable of rational goal-setting [Chambers, 1966; Fama and Jensen, 1982], whereby goals are set prior to the choice and implementation of strategic action. Also, human beings are characterized as possessing a single superordinate goal: "utility-maximization." Within this abstract notion of utility, theories differ as to what may provide utility. Principal-agent theory assumes that an agent will always prefer less work to more [Baiman, 1982], while finance theory assumes that a shareholder/bondholder will desire the maximization of the expected, risk-adjusted return from an investment. Moreover, although only individuals have goals [Cyert and March, 1963; Jensen and Meckling, 1976], collectivities may exhibit purposive behavior that implies consensual goals or common means which are accepted by all members—for example, the maximization of discounted cash flows or the minimization of transaction costs. These assumptions about purposive behavior are necessary because accounting information has long been ascribed a technical rationale for its existence and prosperity: the provision of "useful" and "relevant" financial information for the making of economic decisions [Paton and Littleton, 1940; AICPA, 1973; FASB, 1978]. And usefulness presumes some prior need or objective.

Second, given a belief in individual and organizational purpose, there is an implicit assumption of a controllable social order. While conflicts of objectives, for instance, between principals and agents and between functional departments are recognized, they are conceptualized as manageable. Indeed, it is the effective manager's duty to remove or avoid such conflict through the appropriate design of accounting controls such as budgets, cost standards, cost allocations, and divisional performance criteria [Hopwood, 1974; Zimmerman, 1979; Demski and Feltham, 1978]. Organizational conflict is not seen as reflective of deeper social conflict between classes of people with unequal access to social and economic resources. Constructs such as sustained domination, exploitation, and structural contradictions do not appear in mainstream accounting literature. And conflicting interest groups are classified as possessing different legal rights within a given system of property rights—for example, creditors versus shareholders. They are not categorized using antagonistic dimensions such as class or ownership of wealth.

Further, conflict is usually perceived as being "dysfunctional" in relation to the greater corporate goal (whatever it may be). Examples of "dysfunctional" conflict include "budget biasing," "opportunistic behavior," "self-interest with guile," and "rigid, bureaucratic behavior." Dysfunctional behavior occurs when individual or group interests override what is best for the organization in some reified sense [Tiessen and Waterhouse, 1983; Williamson, Wachter, and Harris, 1975; Hopwood, 1974]. The accounting researcher then seeks to specify procedures whereby such dysfunctions may be corrected.

Finally, some mainstream researchers imply that organizations and "free" markets have an inherent tendency to achieve social order. Left to themselves, organizations appear to "naturally" evolve administrative and accounting systems that minimize transaction costs in changing environmental conditions [Fama and Jensen, 1982; Chandler and Daems, 1979]. Also, the desirable amount of financial disclosure may be determined by the "free" play of market forces with a minimum of state intervention [Benston, 1979–80]. Indeed, Jensen and Meckling [1980] attribute certain financial crises, for example the bankruptcy of Penn Central Railroad, to the State abrogation of individual property rights [Tinker, 1984]. People and markets thus appear to achieve order by themselves.

Theory and Practice

In terms of the relation between theory and practice, mainstream accounting researchers insist upon a means-end dichotomy. That is, accountants should deal only with observations of the most "efficient and effective" means of meeting the informational needs of a decision-maker but should not involve themselves with moral judgments about the decision-maker's needs or goals. For instance, an accountant might be able to inform the decision-maker that to operate successfully (usually defined through notions of profitability) in an uncertain environment, a rigid, budgetary system is unsuitable. However, the accountant cannot instruct a decision-maker to operate in a certain/uncertain environment nor to adopt a particular budgeting system. Thus, only "conditionally prescriptive" statements of the form "if you want *X*, then I recommend *Y*" are offered.

That this supposedly "value-free" stance itself represents the choice of a moral, value-laden position is not often recognized. Instead, its apparent "neutrality" is widely accepted and advocated by members of the academic accounting community. Hence, Chambers [1966, pp. 40–58] argues that the accountant can only provide information about the financial means available for the satisfaction of given ends. Since such information is independent of any particular goal and the value placed upon that goal, accounting may be regarded as "neutral" information and value-free in that sense. Similarly, Sterling [1979, p. 89] argues that accountants as scientists may make "ought" statements about the means that are appropriate for the achievement of a given goal. And Gonedes and Dupoch [1974] contend that researchers can only assess the effects but not the desirability of alternative accounting methods.

Table 2 summarizes these assumptions which provide a common framework for mainstream accounting research.

MAINSTREAM ACCOUNTING—CONSEQUENCES AND LIMITATIONS

There are several consequences flowing from this set of dominant assumptions. First, because of the belief in a means-end dichotomy, accounting researchers take as given and natural [Tinker, 1982] a current institutional framework of government, markets, prices, and organizational forms. Questions about the goals of a decision-maker, firm, or society are seen as outside the province of the accountant. Similarly, concerns about the system of property rights, economic exchange, and the distribution and allocation of wealth and wealth-creating opportunities are not raised. Mainstream accounting research does not have as one of its expressed purposes an attempt to evaluate and possibly change an institutional structure. Societies may be capitalist, socialist, or mixed, and markets may be monopolistic or firms exploitative. The accountant, however, is said to take a neutral value position by not evaluating these end-states. His/her task is simply the provision of relevant financial information on the means to achieve these states. And as such goals, governing structures, or relations of exchange and production change, so does a flexible accounting system.

TABLE 2

DOMINANT ASSUMPTIONS OF MAINSTREAM ACCOUNTING

A. Beliefs About Knowledge	Theory is separate from observations that may be used to verify or falsify a theory. Hypothetico-deductive account of scientific explanation accepted. Quantitative methods of data analysis and collection which allow generalization favored.
B. Beliefs About Physical and Social Reality	Empirical reality is objective and external to the subject. Human beings are also characterized as passive objects; not seen as makers of social reality. Single goal of utility-maximization assumed for individuals and firms. Means-end rationality assumed. Societies and organizations are essentially stable; "dysfunctional" conflict may be managed through the design of appropriate accounting control.
C. Relationship Between Theory and Practice	Accounting specifies means, not ends. Acceptance of extant institutional structures.

This supposedly neutral position, however, runs into difficulties. This itself is a value position which cannot logically be argued as "superior" to a position that judges goals in the name of some ideal. Weber [1949] recognized that the very distinction between fact and value is itself a value judgment. Also, it amounts to conservative support, however indirect, of the status quo. By not questioning extant goals, there is a tacit acquiescence with what is. Tinker, Merino, and Neimark [1982] have also argued that such support helps to legitimize extant relations of exchange, production, and forms of suppression.

Further, the assumptions about human purpose in mainstream accounting research have undermined the means-end dichotomy. For once the notion of "dysfunction" is admitted, it becomes difficult to separate a prescription of means from a prescription of ends. Rarely do accountants write "technique *X* is dysfunctional only if the goal of the firm is to maximize the discounted value of its future cash flows." Indeed, the described/prescribed end becomes increasingly accepted until it is a part of our "common-sense" knowledge.

A second limitation relates to the assumption of human purpose, rationality, and consensus. When these consensual goals of "utility-maximization" are examined, they invariably are the goals of the providers of capital. Although accountants and auditors sometimes suggest that they act in the "public interest," it is generally accepted that both managerial and external financial reports are intended to protect the rights of investors and creditors [The Corporate Report, 1975; AICPA, 1973]. In addition, internal control and contracting procedures have as their expressed aim the prevention of managerial and worker "excesses" and the safeguarding of the rights of "residual claimants" [Fama and Jensen, 1982]. Influenced by traditional micro-economics, mainstream accounting thought is based on the notion of the prior claims of the "owners" and further implies that the satisfaction of these claims provides the means to satisfy all other claims. For example, it is assumed that workers desire a maximization of cash flows or long-run profit, for without that they could not be paid.

Can one make such a simplistic assumption of a corporate welfare function? Do all organizational members agree on some ambiguous common end or means to that end? Or have such beliefs left us with an overly-rational and consensual model of human action and the role of accounting [Cooper, 1983; Burchell et al., 1980]? Recent organizational theory [Weick, 1979; Meyer and Rowan, 1977; March and Olsen, 1976; Georgiou, 1973] has begun to question this goal-driven, rational basis of individual and organizational action. It has moved beyond Simon's [1976] notion of bounded rationality and argues that perhaps people do not strive towards goals but retrospectively reconstruct goals to give meaning to action. Goal statements then become the "son" rather than the "father" of the deed, and people with solutions look for problems rather than vice versa.

This "loosening" of the rationality assumption has been accompanied by a new set of metaphors that stress not the structured, causal patterns of organizational life but the fluidity and equivocality of human action and processes. Concepts such as "negotiated orders" [Strauss et al., 1963], "organized anarchies," "loose coupling," "enactment and organizing" [Weick, 1979], "organizational garbage cans" [Cohen, March, and Olsen, 1972], and "messy" organizations [Mintzberg, 1979] all emphasize organizations as complex sets of interactions and rules that are constantly being negotiated, produced, and reproduced.

In addition to this process orientation, there is a renewed interest in power and political struggles [Benson, 1977a, 1977b] within and between organizations [Burawoy, 1979; Benson, 1975; Marglin, 1974] and interest groups [Larson, 1977; Heydebrand, 1977]. No longer are organizations assumed to be collectivities wherein conflicts are successfully mediated through contracting arrangements and "the market." Instead, they are seen as possible repositories of deep conflict which reflect wider, societal contradictions and crises [Burrell, 1981; Clegg, 1981]. Mainstream accounting research has largely neglected these developments which may offer new insights into the power effects of accounting and accountants within organizations and societies.

A third limitation of the set of dominant beliefs is the lack of awareness of controversies within the philosophy of social science which have questioned realism and the empirical testability of theories. Beginning with Popper [1972a] and continuing through the arguments of Kuhn [1970], Lakatos [1970], and Feyerabend [1975], post-empiricist philosophy has generally agreed that observations are fallible propositions which are theory-dependent and therefore cannot act as the neutral arbitrator between competing theories. Indeed, the search for a trans-historical, permanent criterion of acceptability is now seen as a futile exercise [Bernstein, 1983]. This consensus has been accompanied by a revived interest [Geertz, 1979; Winch, 1958] in certain trends in German philosophy [Gadamer, 1975; Wittgenstein, 1953] that emphasize the historically-bounded nature of all conceptual languages.

These arguments have coalesced such that the philosophy of science is in a state of flux; without the comfort of a neutral, objective reality, it faces the threat of an absolute relativism of truth and irrational theory choice [Barnes and Bloor, 1982; Feyerabend, 1975], and is traversed by different attempts to ground a rational set of criteria for theory adjudication [Habermas, 1978; Popper, 1972a; Kuhn, 1970]. Mainstream accounting thought has devoted insufficient attention to these philosophical debates. There is some discussion of Popper's falsifiability criterion, but little of Lakatos's extensions or of other concepts of the function of theorizing and the standards necessary for theory acceptance. Instead, accounting researchers work within some vague notion of an objective reality and of confronting theory with data.

Despite these limitations, it is important to recognize the virtues of the philosophical assumptions which ground mainstream accounting research. As Bernstein [1976, p. xxii] points out, at their best they have insisted upon clarity and rigor, been committed to the ideal of public and intersubjective tests, and have instilled a healthy skepticism toward "unbridled speculation and murky obscurantist thought." These intellectual virtues have also been linked with a genuine belief that neutral, empirical knowledge can not only help people to escape from superstition and prejudice, but provide informed judgment which will better people's relations with their natural and social environment.

Mainstream accounting research has attempted to develop useful, generalizable knowledge which can be applied in organizations to predict and control empirical phenomena. It has insisted on certain standards of validity, rigor, and objectivity in the conduct of scientific research. But these once liberating assumptions have ignored new questions being raised in other disciplines, imposed ever more severe restrictions on what is to count as genuine knowledge, and obscured different and rich research insights. The rest of this paper examines the consequences of changing these philosophical assumptions. It discusses two alternative world-views: the interpretive and the critical.

THE INTERPRETIVE ALTERNATIVE —ASSUMPTIONS

This alternative is derived from Germanic philosophical interests which emphasize the role of language, interpretation, and understanding in social science. As Schutz [1967, 1966, 1964, 1962] has been one of the most influential proponents of this alternative, his ideas form the core of the description here.

Beliefs about Physical and Social Reality

Schutz begins with the notion that what is primordially given to social life is an unbroken stream of lived experience. This "stream of consciousness" has no meaning or discrete identity until human beings turn their attention (self-reflect) on a segment of this flow and ascribe meaning to it. Experience to which meaning has been retrospectively endowed is termed behavior. Social science is generally concerned with a special class of meaningful behavior—actions—which is future-oriented and directed towards the achievement of a determinate goal. Because actions are intrinsically endowed with subjective meaning by the actor and always intentional, actions cannot be understood without reference to their meaning.

However, in everyday life actions do not take place in a vacuum of private, subjective meanings. While human beings are continuously ordering and classifying ongoing experiences according to interpretive schemes, these schemes are essentially social and intersubjective. We not only interpret our own actions but also those of others with whom we interact, and vice versa. Through this process of continuous social interaction, meanings and norms become objectively (intersubjectively) real. They form a comprehensive and given social reality which confronts the individual in a manner analogous to the natural world. In addition, despite continual refinement and modification of this social stock of knowledge, there are some temporarily stable constructs which become institutionalized, taken for granted, and used to typify (structure) experiences. These typifications are an essential part of the social frameworks within which actions are made intelligible.

Beliefs about Knowledge

Given this view of a subjectively-created, emergent social reality, the research questions that are pertinent are: how is a common sense of social order produced and reproduced in everyday life; what are the deeply-embedded rules that structure the social world; how do these typifications arise, and how are they sustained and modified; what are the typical motives that explain action? In essence, the interpretive scientist seeks to make sense of human actions by fitting them into a purposeful set of individual aims and a social structure of meanings.

These explanations or models of the life-world must conform to certain criteria. The first is logical consistency. Schutz [1962, p. 43] writes that the "system of typical constructs designed by the scientist has to be established with the highest degree of clarity and distinctness of the conceptual framework implied and must be fully compatible with the principles of formal logic." This postulate is required to ensure the "objective validity of the thought objects constructed by the social scientist." The second is "subjective interpretation" which means that the scientist seeks the meaning which an action had for the actor. Finally, there is the postulate of adequacy. As there is no neutral, objective world of facts which acts as the final arbitrator, the adequacy of a theory (or explanation of intention) is assessed via the extent to which the actors agree with the explanation of their intentions.[4]

How does one carry on this task of interpretive understanding? Initially, it was mistakenly thought that the observer had to "jump into the shoes/skins" of the observed. Such a notion has been rightly discarded. However, it remains difficult to specify precise procedures for the conduct of interpretive research, such methods being similar to those of the anthropologist. They emphasize observation, awareness of linguistic cues, and a careful attention to detail. Each item of information has to be interpreted in the light of other items drawn from the language and ideology of the "tribe" under investigation [Feyerabend, 1975, p. 251] rather than through

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[4] Schutz writes, "Each term in a scientific model of human action must be constructed in such a way that a human act performed within the life-world by an individual actor in the way indicated by the typical construct would be understandable for the actor himself as well as for his fellow-men in terms of common sense interpretations of everyday life. Compliance with this postulate warrants the consistency of the constructs of the social scientist with the constructs of common-sense experience of the social reality" [Schutz, 1962, p. 44].

This postulate is similar to the positivist notion of verification and reflects Schutz's agreement with Nagel and Hempel on a number of important issues. These are: (a) all empirical knowledge involves discovery through processes of controlled inference, must be statable in propositional form, and must be capable of being verified through observation; (b) theory means the explicit formulation of determinate relations between a set of variables that explains a fairly extensive class of empirical regularities; and (c) a social scientist should seek to be completely disinterested in the construction of objective explanations.

Schutz's position, however, is not necessarily accepted by other interpretive philosophers. Gadamer [1975], for instance, rejects the feasibility of a "disinterested observer" and implies that competing theories can only be judged by (unspecified) historically-bound criteria that are temporarily agreed upon by a community of scientists.

TABLE 3

DOMINANT ASSUMPTIONS OF THE INTERPRETATIVE PERSPECTIVE

A. Beliefs About Knowledge

Scientific explanations of human intention sought. Their adequacy is assessed via the criteria of logical consistency, subjective interpretation, and agreement with actors' common-sense interpretation.

Ethnographic work, case studies, and participant observation encouraged. Actors studied in their everyday world.

B. Beliefs About Physical and Social Reality

Social reality is emergent, subjectively created, and objectified through human interaction.

All actions have meaning and intention that are retrospectively endowed and that are grounded in social and historical practices.

Social order assumed. Conflict mediated through common schemes of social meanings.

C. Relationship Between Theory and Practice

Theory seeks only to explain action and to understand how social order is produced and reproduced.

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a priori definitions. Meanings are themselves built on other meanings and social practices. As such, "thick" case studies conducted in the life-world of actors are preferred to distant large-scale sampling or mathematical modeling of human intention.

Beliefs about the Social World

The main beliefs about people are (a) the ascription of purpose to human action, and (b) the assumption of an orderly, pre-given world of meanings that structures action. However, Schutz argues that purposes always have an element of pastness, for only the already experienced may be endowed with meaning in a backward, reflective glance. Further, purposes are grounded in changing social contexts and are not pre-given.

Theory and Practice

As Fay [1975] points out, interpretive knowledge reveals to people what they and others are doing when they act and speak as they do. It does so by highlighting the symbolic structures and taken-for-granted themes which pattern the world in distinct ways. Interpretive science does not seek to control empirical phenomena; it has no technical application. Instead, the aim of the interpretive scientist is to enrich people's understanding of the meanings of their actions, thus increasing the possibility of mutual communication and influence. By showing what people are doing, it makes it possible for us to apprehend a new language and form of life. Table 3 summarizes these assumptions.

THE INTERPRETIVE ALTERNATIVE —CONSEQUENCES

Some researchers have attempted to study accounting in action and to investigate its role as a symbolic mediator [Hopwood, 1983, 1985, forthcoming; Tomkins and Grove, 1983; Colville, 1981; Gambling, 1977]. The consequences of adopting an interpretive perspective, with its emphasis on understanding, may be highlighted by comparing two pieces of work on budgetary control systems: Demski and Feltham [1978] and Boland and Pondy [1983]. The first is conducted within mainstream assumptions and the second reflects interpretive concerns.

For Demski and Feltham, the "budgetary control system" exists as a facet of reality that is external to the world of the researchers, and indeed, of the principal and the agent. The system exists and its existence is taken for granted; it is an exogenous variable. The budget is not seen as an entity which is "socially constructed" and constituted through interaction. The authors then seek to explore general conditions that may explain the use of such control systems in a particular setting. This setting is described in the abstract language of economics, in terms of contracts between principal and agent and a market for information exchange in which "equilibrium" and "Pareto-optimal solutions" may be found. A mathematical model of principal-agent behavior is then constructed with several manageable variables: the state of the world, worker effort, skill, and amount of capital. Based on an analysis of this model, some generalizable conclusions are drawn, for instance that "market incompleteness" and "risk aversion" are necessary conditions for the choice of budgetary systems. There is also a limited attempt to attest to the validity of the model by assessing how well it explains observed practice.

Single goals of utility-maximization are attributed to the principal and the agent. The principal "contracts for labor services so that he can obtain a return from his capital without expending any effort [He achieves maximum leisure]" [p. 338]. The agent's utility depends on his level of output/income and also the amount of effort expended (He prefers less effort to more [p. 342]). Other researchers working within this theoretical framework use similar models of human intention. Zimmerman [1979, p. 506], for instance, assumes all individuals to be "resourceful, evaluative, maximizing men (or REMMs)." In addition, Baiman [1982, p. 170] points out that each individual is assumed to act in his or her own interest and expects all other individuals to act solely to maximize their own best interests.

There are also implicit assumptions of what is dysfunctional for the "organization," that is, for both the principal and the agent. Demski and Feltham speak of moral hazard and adverse selection problems. These are essentially information-based problems which arise because the principal is unable to accurately report the agent's input choice and verify information that is private to the agent. In addition, "shirking" by either principal or agent is regarded as unhelpful and to be controlled, in this instance, through a budget-based contract. However, there appears to be greater emphasis placed on control of the agent. He or she appears more likely to engage in dysfunctional behavior. Thus, Demski and Feltham write that the budget-based contract is used to "learn something" [p. 339] about the agent's behavior. Similarly, Zimmerman [1979, p. 506] argues that "we would expect (as should the principal) that the agent will try to improve his welfare by engaging in activities which are not necessarily in the principal's best interest (e.g. shirking, on-the-job leisure, consumption of perquisites, theft)."

Boland and Pondy, by contrast, do not take the budget as a permanent, fixed object. Instead it is "symbolic not literal, vague not precise, value loaded not value free" [p. 229]. At certain times, the budget plays an active role in shaping reality [p. 228] and is in turn influenced by political interests (for example, those of the Governor of Illinois) and social definitions of "acceptable and legitimate" (categories like "repair and maintenance" being more viable than "research"). There is no *a priori* assumption that the budget has a rational, technical purpose; instead, its symbolic, emergent role is seen to be grounded in the social processes of the organization and its environment. Neither is there an attempt to accord priority to particular goals and to speak of "dysfunctional" behavior. In fact, the authors suggest that organizational goals were being discovered through the budget process.

Further, the budget and its setting are located in the everyday, common-sense language of the participants. Indeed, one of the authors' aims was to study accounting through the actors' definition of the situation [p. 225]. Also, unlike Demski and Feltham, Boland and Pondy do not seek to develop generalizable explanations of behavior which may be used to predict and control such behavior in similar settings. Their most generalizable statement is: There are constant shifts between the rational, quantitative aspects of organization and the natural, qualitative aspects [p. 226]. Because generalizations are not their aim, the authors advocate the use of case studies to understand accounting as a lived experience [p. 226]. Unfortunately, Boland and Pondy are unclear as to how the adequacy of their explanation may be evaluated. On p. 226, they write that the researcher should take a "critical view" of the actor's definition of the situation. This departs from Schutz's idea of the non-evaluative, disinterested scientist and his postulate of adequacy.

The differences between these two approaches to the study of the same phenomenon illustrate the distinctive contributions of an interpretive emphasis. First, the perspective indicates that, in practice, accounting information may be attributed diverse meanings. Such diversity is intrinsic to an emergent social and accounting reality that is constantly being redefined. In addition, these meanings will be constituted by changing social, political, and historical contexts. They do not necessarily conform to *a priori* rational definitions, such as "being useful for efficient decision-making." Accounting numbers are inadequate representations of things and events as experienced by human beings. Because of this, actors will seek to transcend the formality of the numbers and manipulate their symbolic meaning to suit their particular intentions [Boland and Pondy, 1983; Cooper, Hayes, and Wolf, 1981]. Indeed, Hayes [1983] suggests that the ever-expanding demand for accounting information may be because of this intrinsic ambiguity which allows complex trade-offs among interest groups.

Second, not only are accounting meanings constituted by complex interpretive processes and structures, they help constitute an objectified social reality [Berry et al., 1985; Hayes, 1983; Boland and Pondy, 1983; Cooper, Hayes, and Wolf, 1981; Burchell et al., 1980]. For example, the traditional responsibility accounting map of the organization helps to consolidate a particular view of hierarchy, authority, and power. Accounting numbers give visibility to particular definitions of "effectiveness," "efficiency," and that which is "desirable" and "feasible." In this way, accounting numbers may be used to actively mobilize bias, to define the parameters permissible in organizational debates, and to legitimize particular sectional interests.

Accounting information is particularly useful for legitimization activities because they appear to possess a neutral, technical rationality. Numbers are often perceived as being more precise and "scientific" than qualitative evidence.

Even among actors/players who are aware of the imprecision of these numbers, public debates continue to be organized around such numbers because that is considered the proper arena for discussion. Thus, in Boland and Pondy's [1983] case study, the Governor of Illinois continues to use the budget as evidence of his good faith despite the fact that he had obviously "fiddled" the numbers. Accounting often becomes a "sacred" language [Bailey, 1977] that is publicly acceptable. To talk otherwise, for example, by exposing the dubious nature of such numbers or by being skeptical of high-sounding principles ("the public interest"), may be considered "profane." Bailey argues that profane talk is usually conducted in private where messy compromises are then retranslated into a public, sacred (for example, accounting) language such that rationality and the appearance of order are maintained.

Third, the interpretive perspective questions the traditional view of accounting information as a means of achieving pre-given goals. Information may be used to accord rationality after the event [Weick, 1979; Cohen, March, and Olsen, 1972]. Similarly, accounting information may be used to retrospectively rationalize action and to impose a goal as though it always existed. In addition, although local objectives may initiate the desire for particular types of accounts, these may merge with other diverse, possibly conflicting objectives such that the results cannot be said to be intended by any particular party. As Burchell, Clubb, and Hopwood [1985] write, although accounting may be purposive, whether it is intentionally purposeful is a matter for detailed empirical investigation.

Finally, the interpretive perspective does not assume that conflict is inevitably "dysfunctional." The concept of "dysfunction" does not arise because no priority is given to particular human goals. Goals and their priority are argued to be constituted through human interaction.

As can be seen, changing the set of philosophical assumptions about knowledge and the empirical world gives us a new purpose for theorizing, different problems to research, and an alternative standard to evaluate the validity of research evidence. There is much to be gained by moving accounting into the life-world of actors. Instead of constructing rigorous but artificial models of human action which presume rational, consensual goals, the approach offers an understanding of accounting in action. It seeks the actor's definition of the situation and analyzes how this is woven into a wider social framework. This interpretive emphasis is valuable, for as Burchell et al. [1980] point out, we know how accounting numbers ought to function but have little knowledge of the meanings and roles that they actually undertake. And unless such information is obtained, we may only have an abstract image of the accounting discourse that is fossilized in our journals and textbooks and is unrelated to practice.

THE CRITICAL ALTERNATIVE —ASSUMPTIONS

Interpretive work, however, also possesses weaknesses. There have been three major criticisms of the approach [Habermas, 1978; Bernstein, 1976; and Fay, 1975]. First, it has been argued that using the extent of actor agreement as the standard for judging the adequacy of an explanation is extremely weak. How does one reconcile fundamental differences between the researcher and the actors? Also, how does one choose between alternative explanations, such as those of a Marxist and a non-Marxist? As yet these issues have not been settled. Second, the perspective lacks an evaluative dimension. Habermas [1978], in particular, argues that the interpretive researcher is unable to evaluate critically the forms of life which he/she observes and is therefore unable to analyze forms of "false consciousness" and domination that prevent the actors from knowing their true interests. Third, the interpretive researcher begins with an assumption of social order and of conflict which is contained through common interpretive schemes. Given this and the focus on micro-social interaction, there is a tendency to neglect major conflicts of interest between classes in society.

These difficulties have given rise to various attempts to transcend the problems of both mainstream and interpretive perspectives. In philosophy and sociology, such work is exemplified by writers such as Poulantzas [1975], Lukacs [1971], Habermas [1979, 1978, 1976, 1971], and Foucault [1981, 1980, 1977]. Despite major differences between the work of these writers, there are also commonalities.

Beliefs about Physical and Social Reality

The most distinctive idea that the majority of researchers in this perspective share dates from the work of Plato, Hegel, and Marx. It is the belief that every state of existence, be it an individual or a society, possesses historically constituted potentialities that are unfulfilled. Everything is because of what it is and what it is not (its potentiality). In particular, human beings are not restricted to exist in a particular state; their being and their material environment are not exhausted by their immediate circumstances [Held, 1980, p. 234]. Instead, people are able to recognize, grasp, and extend the possibilities contained in every being. It is this quality which distinguishes human beings as universal, free beings [Marcuse, 1968, 1941].

However, human potentiality is restricted by prevailing systems of domination which alienate people from self-realization. These material blockages operate both at the level of consciousness and through material economic and political relations. At one level, ideological constructs may be embedded in our modes of conceptualization, in our categories of common-sense and taken for granted beliefs about acceptable social practices [Lehman and Tinker, 1985]. At another, repression may be effected through rules governing social exchange and the ownership and distribution of wealth.

Another belief concerns the relationship between parts (individuals, groups, organizations) and the whole (society). Critical researchers argue that because any finite thing is both itself and its opposite, things taken as isolated particulars are always incomplete. The particular exists only in and through the totality of relations of which it is a part. Therefore, what a finite thing is and what it is not may only be grasped by understanding the set of relations that surround it. For example, accountants are not isolated particulars. They exist only in the context of groups, classes, and institutions. They are what they are by virtue of their relations as sellers of services, employees, professionals, etc. In this manner, the true form of reality lies not with particulars but with the universal that comes to be in and through particulars.

This emphasis on totality leads to a particular view of the object-subject distinction. Social structures are conceptualized as objective practices and conventions which individuals reproduce and transform, but which would not exist unless they did so. As Bhaskar [1979, pp. 45–46] puts it, "[s]ociety does not exist independently of human activity (the error of reification). But it is not [solely] the product of it (the error of voluntarism)." Rather, society provides the necessary, material conditions for the creative subject to act. At the same time, intentional action is a necessary condition for social structures. Society is only present in human action, and human action always expresses and uses some or other social form. Neither can, however, be identified with or reduced to the other. Social reality is, thus, both subjectively created and objectively real.

Further, because of the belief in human potentiality, there is an emphasis on studying the historical development of entities that are conceptualized as coming to be. Reality as a whole, as well as each particular part, is understood as developing out of an earlier stage of its existence and evolving into something else. Indeed, every state of existence is apprehended only through movement and change, and the identity of a particular phenomenon can only be uncovered by reconstructing the process whereby the entity transforms itself. "To know what a thing really is, we have to go beyond its immediately given state . . . and follow out the process in which it turns into something other than itself. . . . Its reality is the entire dynamic of its turning into something else and unifying itself with its 'other' " [Marcuse, 1941, p. 49].

Beliefs about Knowledge

Critical philosophers accept that the standards by which a scientific explanation is judged adequate are temporal, context-bound notions. Truth is very much in the process of being hammered out and is grounded in social and historical practices. There are no theory-independent facts that can conclusively prove or disprove a theory. In addition, the interpretive standard (degree of consensus between researcher and actors) is considered insufficient. Beyond this weak consensus, critical philosophers disagree as to the precise criteria that may be used to assess truth claims.

Foucault, for example, eschews a transcendent criterion for the establishment of truth. He writes [1977, p. 131], "truth is a thing of this world: it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power. . . ." The scientist cannot emancipate truth from every system of power; he/she can only detatch the power of truth from the forms of domination within which it operates at a particular time. By contrast, Habermas [1976] seeks to establish a quasi-transcendental process for rational theory choice, that simultaneously recognizes the historically-grounded nature of all norms and yet seeks to transcend it. In the face of such substantive diversity, it is not feasible to set out a common standard for the evaluation of theories within the critical perspective.

Finally, the methods of research favored by critical researchers tend to exclude mathematical or statistical modeling of situations. Research is sited in organizations and their societal environments. In addition, quantitative methods of data collection and analysis are used to a lesser extent. There is greater emphasis on detailed historical explanations (Foucault emphasizes the "genealogical approach") and "thick," ethnographic studies of organizational structures and processes which show their societal linkages. The emphasis on long-term historical studies is especially important given the prior belief that the identity of an object/event can only be grasped through an analysis of its history—what it has been, what it is becoming, and what it is not. Such historical analysis also serves the critical function of exposing rigidities and apparently ahistorical relations that restrict human potentiality.

Beliefs about the Social World

Critical researchers view individuals as acting within a matrix of intersubjective meanings. Thus, like the interpretive researcher, it is accepted that social scientists need to learn the language of their subject/object. The process of coming to an understanding is also agreed to be context-dependent as social scientists are necessarily immersed in and engaged with their socio-historical contexts. However, critical researchers argue that interpretation *per se* is insufficient. It cannot appreciate that the world is not only symbolically mediated, but is also shaped by material conditions of domination. Language itself may be a medium for repression and social power. Hence, for Habermas, social action can only be understood in a framework that is constituted conjointly by language, labor, and domination. Through such a framework, symbolic schemes and traditions would also be subjected to critique such that their relations to other material forms of domination were revealed [Held, 1980, pp. 307-317].

A critique of ideology is considered necessary because fundamental conflicts of interest and divisions are seen to exist in society (indeed, are endemic to contemporary society) and to be institutionalized via cultural and organizational forms. The organization is viewed as a middle-range construct, a microcosm of society that reflects and consolidates alienating relations. Because of this, distinctions between societal and organizational levels of analysis are blurred. One level is seen to support and be supported by the other, and conflicts within organizations create and are created by societal divisions.

Theory and Practice

Theory now has a particular relationship to the world of practice. It is/ought to be concerned with "the freedom of the human spirit," that is, the bringing to consciousness of restrictive conditions. This involves demonstrating that so-called objective and universal social laws are but products of particular forms of domination and ideology. Through such analysis, it is intended that social change may be initiated[5] such that injustice and inequities may be corrected. Critical researchers reject the value position traditionally espoused by orthodox social scientists—a scientist cannot evaluate ends—arguing that it bolsters existing forms of injustice inherent in the current system of property rights and in the capitalist appropriation of economic surplus value. Their moral position is that such domination ought to be exposed and changed. Social theory is therefore seen to possess a critical imperative. Indeed, it is synonymous with social critique.

Table 4 sets out these assumptions.

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[5] Critical researchers differ as to the precise role envisaged for the theorist in initiating social change. Habermas [1974], for instance, distinguishes between (a) the formation of critical theories that may be therapeutically applied to initiate a process of "enlightenment" and self-reflection among actors, and (b) the selection of appropriate political strategies. Task (a) is that of the social scientist while task (b) belongs to the actors (community). Habermas took pains to emphasize that theory does not provide the grounds, conditions, or justifications for day-to-day political decisions. This position may be contrasted with that of Althusser [1969] and Poulantzas [1975] who see Marxism as a science that can be employed in developing a political strategy for bringing the working class to power.

TABLE 4

DOMINANT ASSUMPTIONS OF THE CRITICAL PERSPECTIVE

A. Beliefs About Knowledge

Criteria for judging theories are temporal and context-bound. Historical, ethnographic research and case studies more commonly used.

B. Beliefs About Physical and Social Reality

Human beings have inner potentialities which are alienated (prevented from full emergence) through restrictive mechanisms. Objects can only be understood through a study of their historical development and change within the totality of relations.

Empirical reality is characterized by objective, real relations which are transformed and reproduced through subjective interpretation.

Human intention, rationality, and agency are accepted, but this is critically analyzed given a belief in false consciousness and ideology.

Fundamental conflict is endemic to society. Conflict arises because of injustice and ideology in the social, economic, and political domains which obscure the creative dimension in people.

C. Relationship Between Theory and Practice

Theory has a critical imperative: the identification and removal of domination and ideological practices.

THE CRITICAL PERSPECTIVE —CONSEQUENCES

Considerable interest has been shown in developing accounting research within the critical perspective.[6] To illustrate the differences between the mainstream approach and the critical perspective, two historical explanations of the development of accounting theory and practice are compared: Chandler and Daems [1979] and Tinker, Merino, and Neimark [1982].

Chandler and Daems [1979] focus on the development of accounting practices from the end of the 19th century to 1920–30. They begin by arguing that there are three core economic functions that need to be performed in every economic system. These are the allocation, monitoring, and coordination of activities. These functions may be performed by a number of alternative structures of which the firm and the market are the most important. The choice of structure depends on which mechanism is more efficient, that is, performs these functions at a lower transaction cost. Hence, if the firm structure is used to organize economic production, this is because the firm is more efficient than the market. Also, for the firm to continue to maintain this comparative advantage, it has to continually develop cost-efficient accounting controls that provide the information required to meet the demands of a changing environment.

To Chandler and Daems, firms and accounting controls are parts of a concrete reality which evolve in a rational manner: in response to a need for efficient organization. The firm is pictured as a rational, single-minded, organic system that seeks to survive and adapts its accounting system in order to maintain its economic advantage. On p. 4 this image is tempered by identifying the firm with the activities of owners and managers. However, people as reality-constructors do not feature in the discussion, and there is little mention of intra- and inter-organizational conflict. In addition, the concepts of allocation, monitoring, hierarchy, and efficiency are seen as non-problematic. They are not seen as perpetuating an ideological, managerial bias and as bolstering unequal economic relations.

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[6] See Armstrong [1985], Cooper et al. [1985], Laughlin [1985], Lehman and Tinker [1985], Puxty [1985], Tinker and Neimark [forthcoming], and Willmott [1984, forthcoming].

By comparison, Tinker, Merino, and Neimark [1982] see accounting discourse as being actively involved in social control and in conflicts between different classes of people. Accounting theories do not state an unambiguous truth that is value-free and independent of social and historical conflict. The authors focus on the development of the concept of value from the Middle Ages to the 20th century and argue that this cannot be explained as a rational evolution during which more wisdom was gradually accumulated. Instead, concepts of value constitute and are constituted by social struggles, particularly in the economic domain. Specifically, particular concepts of value became dominant because they benefited the interests of dominant groups in society during a particular period.

Thus, in the pre-mercantile period, value was defined in terms of the socially necessary labor expended on a product [p. 176]. Such a concept of value was acceptable because trade at that time took place between small independent producers. However, as trade and commerce expanded, the concept of value was modified to include the utility and subjective expectations of owners and consumers [p. 177]. This was because the merchants' gains came from the consumer, specifically from the difference in price charged and that paid to the primary producer. Through such a modification of the concept of value, the merchants, it is argued, were able to strengthen their bargaining position relative to the producers and to legitimize their gains as just.

Similarly, the neo-marginalist assumptions that underlie much mainstream accounting are argued to be interested (grounded in the interests of dominant classes) as opposed to being theoretically neutral. In addition, these assumptions are ideological because they obscure other realities such as "market imperfections," unequal distributions of income, and injustices embedded in extant systems of property rights [p. 191]. Finally, Tinker, Merino, and Neimark [1982] attempt to set out a new role for accounting and the accountant that is considered more just and less mystifying.

This brief comparison indicates that accounting research as social critique has several important characteristics. First, accounting is no longer seen as a technically rational, service activity which is divorced from wider societal relationships. Instead, accounting as a discourse with a particular mode of calculative rationality is argued to constitute and be constituted by macro conflict between different classes (for example, capitalist/manager v. worker, the State v. multinational corporations) [Knights and Collinson, 1985; Tinker, 1984; Tinker, Merino, and Neimark, 1982]. At the micro-organizational level, the accounting calculus paints a picture of the "cake" that is available for distribution and reports on how such distributions have been made. At the macro-societal level, these numbers influence taxation policy-making, wage bargaining, and economic restructuring. In all these situations, wealth transfers are involved and the accounting calculus is seen as playing (or potentially playing) a vital role in effecting such transfers.

Second, critique emphasizes the totality of relations (social, economic, political, ideological). As a result, the perspective engenders a new interest in certain macro-structural phenomena that are neglected in mainstream accounting research. An example is the role of accounting information in the regulation of and by the State [Cooper et al., 1985; Cooper, 1984; Hopwood, 1984b; Tinker, 1984]. The State holds a pivotal position in the complex of human relations and is expanding the use of accounting information. In the United Kingdom and Australia, for instance, the State constantly stresses the need for efficiency or value-for-money audits and the development of performance indicators for the public sector. This response to calls for greater public accountability, however, may not indicate that those in government believe in the technical superiority of "rational" methods of financial management. For accounting numbers may be called upon to perform tasks for which they are not equipped: the quantification of welfare trade-offs in activities where neither the inputs nor the outputs desired are clearly specified. Hence, accounting/auditing information may only be used symbolically to rationalize or legitimize power relations.

In addition, the greater use of accounting calculation in the public sector could be because the State finds it difficult to manage the demands of organized capital and labor. Such structural conflict could represent macro-economic problems that the State must be seen to manage: inflation, stagflation, long-term unemployment, an ever-increasing State bureaucracy, and limited opportunities to raise State revenue and to reduce expenditure. How are accounting procedures implicated in the management of these problems? Further, how do such problems relate to the State's attempt to regulate business firms through accounting policy-making and standard-setting bodies? Are accounting standards nothing more than political compromises in a complex arena of organized capital and labor, the government, and the accounting profession? What kinds of roles do these professional pronouncements play given the separate and different interests at work? Their public aim may be the control of public sector or managerial/corporate excesses. How, if at all, is such control effected?

Third, such questions not only emphasize the State as an important constituency, they focus on accountants as an organized interest group. Within a critical perspective, the accounting profession is no longer theorized as a neutral group which evolves in response to rational demands for useful information. Instead, it is an aspiring occupational monopoly that seeks to further its own social and economic self-interests through (a) particular professional ideologies (for example, the universal service ethic), and (b) the policing of changeable and ambiguous relations with other professions, corporations, and the government [Puxty, 1984; Chua, 1982]. For instance, to preserve its territorial advantage from the challenge of engineers, investment advisors, and the State, the accounting profession in the U.S., U.K., and Australia has had to institute new membership controls and standard-setting bodies. Such reforms, however, often are claimed to be for the "protection of the public" (see Willmott [1985] for a critique of this notion), not the profession.

Fourth, the focus on totality also promotes organizational studies that integrate micro- and macro-levels of analysis. This has the effect of avoiding the traditional distinction between management and financial accounting. For instance, exploitative relations or forms of domination at the societal level are seen as reflected and effected through organizations [Habermas, 1978; Foucault, 1977]. Foucault writes that social control is insidiously widespread in institutions such as the school, family, prison, and hospital and is vested in so-called experts whose possession of knowledge has power effects.

His argument is taken up by Crawford [1984] and Miller and O'Leary [1984] who argue that the accounting-expert exercises power in the factory through a procedure like standard cost accounting. Such an accounting technique forms a powerful, managerial tool for the disciplining and control of workers. It sets norms for "proper" behavior and "desirable" outcomes, thereby restricting (normalizing) individual variety and creativity. It also socializes workers into constantly being watched, monitored, and governed. Through such social control the worker becomes a more governable unit within the firm and in society more generally.

Finally, critical theorists claim that the view of accounting information as social control and as a mediator of conflict has often been obscured (mystified) by powerful, ideological ideas embedded in mainstream accounting thought. Accounting is claimed to be a service activity which is "neutral as between ends," when in fact the goals of the owners of capital are implicitly given priority. Also, accountants are pictured as professionals who are independent of biases and who offer universal service to the community. Such claims are, however, seen as highly dubious. Due to the difficulty of policing compliance to the professional ideals of independence and competence at the level of the individual practitioner, peer supervision is often only rhetorical rather than real [Larson, 1977].

Mainstream accounting research is also criticized as perpetuating an objectified (alienated) view of human beings. Labor is seen as a number, a cost to be minimized while profit that accrues to others is regarded as desirable. As Cherns [1978] points out, within accounting, instead of an organization being seen as a resource for people, people are encouraged to think of themselves as a resource for the greater organizational goal of more profit and cash flows. Finally, as discussed earlier, notions of structural conflict and of inequitable domination do not enter into mainstream accounting models of organizational goals. Through the maintenance of these ideas, extant accounting theory and practice is seen as a form of ideology which isolates people from their "true" essence.

Indeed, Lehman and Tinker [1985] argue that the accounting discourse constitutes part of the "ideological apparatus" of the State. Using the work of Althusser, they argue that ideology is more than false ideas perpetuated by, for example, the mass media. Ideology is a "representation of the imaginary relationship of individuals with the real conditions of their existence" [Lehman and Tinker, 1985, p. 9]. It inheres in the taken-for-granted social practices and symbols that people use to interpret and organize their world. The accounting literature, by subtly promoting particular views of the State, "free markets," and the importance of business, is said to institutionalize a biased version of structural conflicts.

The research that a critical perspective initiates clearly differs from that offered by a mainstream or interpretive approach. It poses a particular challenge for the accounting researcher and accounting as a discipline to adopt a radically different value position that may not be easily accepted by mainstream accountants. There is also much intra-disciplinary criticism and debate.

As pointed out earlier, critical theorists do not share common philosophical standards for the evaluation of theories. What is an acceptable theory or explanation is still debatable. In addition, proponents of one form of critical theory may be bitterly criticized by other writers also working in the Marxist tradition (for example, see the discussion of Habermas's work by Anderson [1976] and Slater [1977]). However, this last characteristic of major disagreements among academics is also present in mainstream and interpretive perspectives.

In summary, this perspective offers new insights that are worthy of consideration. As the State plays an ever-increasing role in the economic domain, as the use of accounting information expands in the private and public economic sectors, and as accountants become more involved with policy-making at the macro-level, it may no longer be useful to distinguish the political/social from the economic effects of accounting numbers. Nor may it be helpful to separate the organization from its wider structural relationships. Critique may then offer a way of understanding the role of accounting in these complex contexts.

CONCLUSION

This paper has sought to move accounting debate beyond the stalemate of "incommensurable" paradigms which cannot be rationally evaluated. It has argued that mainstream accounting thought is grounded in a set of common assumptions about knowledge and the empirical world which both enlighten and yet enslave. These assumptions offer certain insights but obscure others. By changing them, new insights may be gained which can potentially extend our knowledge of accounting in action within organizational and societal contexts. Two main alternatives were discussed: the interpretive and the critical. It is hoped that the challenges posed by these alternatives will stimulate consideration and debate.

APPENDIX 1

DIFFICULTIES WITH THE BURRELL AND MORGAN [1979] FRAMEWORK

First, all the assumptions are presented as strict dichotomies; for example, one either assumes that human beings are determined by their societal environment or they are completely autonomous and free-willed. This does not encompass positions such as those of Bhaskar [1979, pp. 31–91], which argue that although societies are prior to and different from individuals, they are continually reproduced and transformed by intentional human action. Neither does it lead to a full appreciation of Habermas's [1978] argument that while individuals do act and shape meanings, they may still live within structures of domination in society. The use of mutually exclusive dichotomies and the derivation of paradigms that cannot be "synthesized" [Burrell and Morgan, 1979, p. 25] fails to locate philosophical attempts to overcome such unsatisfactory dichotomies.

Second, the framework embraces a strongly relativistic notion of scientific truth and reason. Influenced by Kuhn's [1970] idea of a conversion experience, Burrell and Morgan [1979, pp. 24–25] imply that the choice and evaluation of paradigms cannot be justified on rational scientific grounds. This interpretation of Kuhn as encouraging irrationalism (there are no good reasons for preferring one theory to another) as the basis for theory choice misreads his rational intent [see Bernstein, 1983; Gutting, 1980]. On the contrary, Kuhn [1970, pp. 199–200] explicitly writes that accepting a thesis that states that theory-choice is not simply a matter of deductive proof does not imply that there are no good reasons for being persuaded a particular way. Kuhn continues by citing certain evaluative criteria that are "usually listed by philosophers of science" such as accuracy, simplicity, and fruitfulness. These criteria, however, are not universal and fixed but open in their application and weighting.

To read Kuhn as advocating irrationalism is to miss his main point: that traditional notions of what constitutes rational scientific choice are inadequate and need to be modified in order to better understand in what sense such choice is a rational activity. In addition, there is a fundamental tension in the arguments of Burrell and Morgan. On the one hand, they appear to accept Kuhn's argument that there is no trans-historical, neutral, permanent language (set of criteria) for evaluating scientific theories. This presumably is the basis for arguing that each paradigm mutually excludes the other, is incommensurable, and cannot be validly compared or synthesized. Yet by adopting a non-evaluative stance, Burrell and Morgan attempt what Kuhn rejects—the use of a completely neutral language or framework within which rival paradigms can be fully expressed! Burrell and Morgan claim to give each paradigm an opportunity to speak for itself [p. 395]. Where exactly is this privileged, non-evaluative "fifth position" located? (Presumably it must lie outside the four paradigms proposed by the authors!) Thus, Burrell and Morgan appear to both accept and reject simultaneously the existence of a neutral language for cross-paradigmatic discussion.

Moreover, the latent relativism of Burrell and Morgan has been roundly criticized by philosophers of science [see Hollis and Lukes, 1982; Gutting, 1980; Lakatos and Musgrave, 1970]. Relativism is self-referential and paradoxical. For, implicitly or explicitly, the relativist claims that his or her position is true, yet the relativist also insists that since truth is relative, what is taken as true may also be false. Consequently, relativism itself may be true and false.

Finally, as Hopper and Powell [1985] point out, the separation of the radical structuralist from the radical humanist paradigm is not well supported within sociology itself, being based on a contentious reading of Marx's arguments. In addition, such a separation does not adequately place work that seeks to integrate the structuralist and idealist facets of Marx's writings [Habermas, 1976; Poulantzas, 1973].

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Long-Term Trends Toward Seller Concentration in the U.S. Audit Market

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ABSTRACT: This paper builds on the results of prior research on the structure of the U.S. market for audit services. Two complementary empirical approaches are pursued. First, inferences are made about specific aggregate Big Eight comparative advantages from an analysis of auditor selections by 299 sample firms from 1964 to 1980. Second, dynamic trends within the Big Eight are considered by examining changes in individual audit firm market shares across extensive client samples at four points in time—1950, 1960, 1970, and 1980. In general, analysis of auditor change data indicates no substantial upward shift in aggregate Big Eight "equilibrium" market share in the two decades studied. Rather, it would appear that movements in this time-frame to the Big Eight reflect a long process of adjustment to relatively stable conditions of comparative advantage. Changes in within Big Eight market shares, on the other hand, strongly support the notion of increasing intra-Big Eight competition for nonregulated clients.

THIS paper addresses trends towards seller concentration in the U.S. audit market over the past 30 years. Two empirical approaches are employed: (1) observations of the auditor selections of 299 client firms from 1964 to 1980 are used to test for both differences in aggregate Big Eight equilibrium market shares across client submarkets and changes in these equilibrium positions over time; and (2) much larger samples of auditor/client relationships (N=2,857 to 8,098) at four points in time from 1950 to 1980 are used to describe changes within Big Eight, individual audit firm, market share distributions over this time-frame.

The study of market share positions of auditing firms is important because of what the findings might tell about the environment and nature of auditing. How competitive is the market for auditing services? Are there scale effects in the production of audits? Does the level of regulation in client industries affect competition and/or scale effects in the audit market? The answers to these questions can help us begin to understand many

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issues that relate to the economics of auditing. Auditing services are provided in a rich market setting and the dynamic processes and equilibria observed in that setting reveal a great deal about the basic conditions of supply and demand of auditing markets. If, as we assume, clients choose auditors for good economic reasons, the theoretical and empirical study of auditor choice can give insights into some very fundamental issues in auditing: the relationship between auditor competition and the quality of auditor services, the critical mass of clients necessary for the development of requisite expertise levels, the staff size necessary to effectively audit large clients and/or regulated clients, the relationship between competition and pricing of services, and many more. All of these issues, in one way or another, are related to the economics of the audit market. There has been a series of empirical and analytical studies concerned with various aspects of the industrial organization of auditing. Dopuch and Simunic [1980] conclude that the audit market is competitive and that there seem to be economies to audit firm size. Simunic [1980] finds evidence of large auditor competitive advantages in that prices charged by seven of the eight largest firms were lower than their non-Big Eight competitors. Eichenseher and Danos [1981] and Danos and Eichenseher [1982] offer evidence consistent with large firm advantages among publicly-traded clients and regulated clients. Also, changes in both overall and client industry audit firm market shares seem to be related to scale economies, although very large market shares in unregulated client industries tend to erode. DeAngelo's [1981b] analysis of the relationship between audit firm size and the quality of audits gives a plausible argument that larger audit firms have greater incentives to be independent than do smaller firms because of their larger potential loss in reputation if failure to report accurately is detected. Larger firms therefore benefit in a competitive sense because their very bigness signals higher quality. In this study, we assume a link between audit firm market positions and comparative advantages. We look for patterns in market share positions across several periods of time and client types. From the results of tests of a multivariate model of auditor selection, we make inferences about several of the above listed issues, in particular, those related to scale economies in the provision of audit services.

Consistent with prior findings [Dopuch and Simunic, 1980], Big Eight comparative advantages appear greater for larger clients. Test results, however, do offer several new insights into the recent evolution of the U.S. audit market. The pattern of Big Eight relative comparative advantages appears to have shifted from the 1960s to the 1970s. While net movements to the Big Eight were centered on large, publicly-held, and growing sample client firms from 1964 to 1972, auditor changes from 1973 to 1980 indicate a more generalized movement to the Big Eight across all client firms. Nonetheless, taken in total, these empirical results offer little support for substantial upward shifts in Big Eight "equilibrium" market share positions during the 1970s. In almost all market subsectors, "equilibrium" positions inferred from auditor change data remained quite stable from the 1960s to the 1970s, but existing Big Eight market shares in 1980 continued to lag well behind the apparent "equilibrium" positions. In short, longitudinal test results support the notion that observed auditor changes in the U.S. audit market in the recent past reflect a long-term adjustment to a fairly stable equilibrium distribution of clients across large and small audit firms. This interpretation of empirical findings, while consistent with substantial transaction costs for auditor change, calls into question causal links between recent changes in the audit environment (e.g., burgeoning standards) and client movements to the Big Eight.

Descriptive statistics obtained from the second empirical approach indicate strong trends towards the equalization of individual CPA-firm market shares within the Big Eight from 1950 to 1980. Particularly in the auditing of unregulated clients, aggregate Big Eight gains appear centered on those Big Eight firms with the smallest market shares in 1950. Thus, support is found for the notion of increasing competition among a small set of suppliers (audit firms) in the U.S. audit market.

Throughout the empirical analysis presented in this paper, differences in audit market conditions for regulated clients are apparent. A statistically significant upward shift in aggregate Big Eight equilibrium market share for regulated clients is found in the 1970s. And, consistent with prior research [Danos and Eichenseher, 1982], within Big Eight CPA firms, market share differentials are maintained and even accentuated in the public utility, oil and gas, and railroad industries from 1950 to 1980. Clearly, scale economies available to CPA firms as a byproduct of client regulation cannot be ignored in our efforts to understand and model the economics of auditing.

The remainder of this paper consists of six sections. Section I discusses the client dimensions considered in forming audit submarkets for subsequent analysis. Section II focuses on apparent changes in underlying audit market conditions from 1965 to 1980 and the adjustment process in this market. Section III defines the variables and discusses empirical methods for longitudinal tests, while Section IV provides the results of these tests. Section V details and describes results of the second empirical approach. Section VI concludes with a summary of empirical findings and a brief discussion of policy implications flowing from the research.

I. Relevant Dimensions to the U.S. Audit Market

Client Size and Client Growth

Prior research, e.g., Dopuch and Simunic [1980], has highlighted differences in audit firm market shares based on client size, with larger clients found to employ larger audit firms. Several plausible reasons for this tendency can be posited. Larger clients may have characteristics that give comparative advantages to larger audit firms such as geographical dispersion [Benston, 1979-1980] and the need for complex accounting rules [Hepp and McRae, 1982].

Audit technology may also render client size *per se* an important variable in determining audit-firm differentials. Larger audit firms have a greater percentage of inexperienced personnel and more fine gradations in personnel ranks [Arnett and Danos, 1979, pp. 98-105]. These phenomena may indicate differences in cost structure according to audit firm size, with larger firms applying less costly human resources and more sophisticated management systems. While the preceding argument may imply that larger firms have cost advantages over smaller firms across all client sizes, cost advantages should certainly increase with the size of the client firm if larger clients involve greater time spent on routine tasks.

The above arguments point to client

size as explanatory of client-auditor alignments. From a dynamic view, they also support the assertion that, over time, growth in client size is associated with an increased propensity to employ larger audit firms.

Client Capital Markets

Eichenseher and Danos [1981] argue that economies of scale characterize the supply of audits to clients subject to capital-market regulations, such regulation giving rise to the demand for specialized accounting and reporting expertise. They find significant positive correlation between industry-specific auditor concentration levels and the percentage of industry members listed on the American and New York Stock Exchanges. However, since their study was limited to clients registering with the SEC, they provide no evidence on the general impact of national capital-markets regulations on the market for audit services. The previous findings point to the need for a direct comparison of auditor-client alignments in public and private domains, and the current study makes that comparison.

Client Industry Regulation

Previous research findings point to the possibility that large audit firms have comparative advantages in highly regulated industries. Danos and Eichenseher [1982] conclude that industry regulation is a significant explanatory factor in a model of market share changes for individual audit firms. They found that audit firms with large initial market shares in regulated industries could maintain and even increase their market shares over time, in contrast to some erosion in market shares for audit firms with high levels of concentration in nonregulated industries.

II. CHANGES IN AUDIT MARKET EQUILIBRIUM

Changes in the Audit Environment

The time period chosen for the first part of this study, 1965 to 1980, is one of change in the audit environment. Standards for accounting and auditing proliferated during the period, requiring audit firms to develop more complex expertise systems. The period in question saw the advent of the term "standards overload" [Hepp and McRae, 1982] and growing pressures on small audit firms to cope with new and more complex rules.

Technological innovation also characterized the 1965 to 1980 period. Both client and audit firms greatly increased their use of computers during the period. The widespread use of statistical sampling and formalized analytical review also dates primarily from 1965 to the present. To the extent that these changes in the audit production environment had systematically different effects on CPA firms of different sizes, we can expect to see changes in auditor-client alignments during the period. In particular, strong arguments can be made for greater comparative advantages accruing to larger audit firms.

In addition to the apparent changes in the production environment of audits, the past two decades have witnessed great changes in the processes by which auditors are chosen and evaluated. It is widely believed that competition among audit firms has increased substantially [Bernstein, 1978]. Arnett and Danos [1979] conclude:

> In general, respondents (management of a wide range of audit firms) felt that competitive pressures are greater today than they were at any time in the recallable past . . . [p. 48]

Recent changes in the professional

code of ethics regarding advertising and client solicitation are part of the changing competitive environment. The number of "outside" directors and audit committees has also increased dramatically. The 1960s and 1970s also witnessed increased litigation for clients and auditors, with concurrent increases in professional insurance costs [Arnett and Danos, pp. 37–38].

For each change in market conditions noted above, arguments can be made for relative advantages accruing to the large audit firms. Factors such as increasing advertisements and marketing sophistication, rising litigation costs, and the advent of audit committees formally reviewing audit proposals all point to competitive advantages for larger firms.

Contemporaneous and Noncontemporaneous Adjustments

Although many seemingly important changes in underlying audit market conditions have occurred recently, it is not clear that changes in auditor-client alignments would quickly reflect such changes. If transactions costs to changing auditors are substantial, switches may lag into subsequent periods. Incumbent auditors may have cost advantages in terms of start-up costs for both auditor and client, which may delay or prevent changes in auditors [DeAngelo, 1981a and 1981b].

The potential effects of transactions costs present problems in attempting to link switches in auditors with changes in underlying conditions of supply and demand in the audit market. Two points can be made. One, the observed changes in alignment patterns need not reflect contemporaneous changes in these conditions. And, two, given less than instantaneous adjustment to changes in underlying conditions of supply and demand, existing comparative advantages for audit firms of different sizes are probably more readily inferred from dynamic (auditor change) data than from static market share positions, since audit-firm selections, given the decision to change auditors, should not be influenced by "sunk" auditor change costs.

III. LONGITUDINAL EMPIRICAL METHODS

Introduction

The key to longitudinal tests pursued in this paper is the notion of an "equilibrium" Big Eight market share. Empirical tests are designed to capture evidence of differences in this equilibrium over market subsectors (i.e., several client groupings with common attributes within groups) for a given time-frame or over time-frames within a given market subsector. "Equilibrium" is defined, in general, as the distribution of clients between Big Eight and non-Big Eight audit firms which would result if (currently) observed patterns of auditor change continued indefinitely into the future. Two variables are of primary concern in determining such equilibrium positions:

$P_{g\tau i}$ = the probability that an existing non-Big Eight client of type *i* will move to a Big Eight audit firm within a specific time-frame τ;

and

$P_{L\tau i}$ = the probability that an existing Big Eight client of type *i* will move to a non-Big Eight audit firm within time-frame τ.

This research takes two eight-year time-frames as the basic units of observation, the period from 1965 to 1972 ($\tau=1$) and that from 1973 to 1980 ($\tau=2$).

If the Big Eight gain and loss parameters ($P_{g\tau i}$ and $P_{L\tau i}$) remain constant over time, Big Eight market share will converge on

$$\frac{P_{g\tau i}}{P_{g\tau i}+P_{L\tau i}}=MS_{\tau i}=\text{“equilibrium” Big Eight market share for client type } i.$$[1]

For the purposes of empirical tests, asymptotically unbiased estimators for equilibrium Big Eight market share position in market subsector i, given observed auditor changes during time-frame τ, are formed as:

$$Y_{\tau i}=\frac{\hat{P}_{g\tau i}}{\hat{P}_{g\tau i}+\hat{P}_{L\tau i}}$$

where

$$\hat{P}_{g\tau i}=\frac{n_{g\tau i}}{n_{0\tau i}}$$

$$\hat{P}_{L\tau i}=\frac{n_{L\tau i}}{n_{8\tau i}}$$

$n_{g\tau i}$ = the number of type i clients switching from non-Big Eight to Big Eight auditors during τ,

$n_{L\tau i}$ = the number of type i clients switching from Big Eight to non-Big Eight auditors during τ,

$n_{0\tau i}$ = the total number of type i non-Big Eight clients at the beginning of τ, and

$n_{8\tau i}$ = the total number of type i Big Eight clients at the beginning of τ.

Subsequent tests involve two generic null hypotheses:

$H_{01\tau}$: for time-frame τ, $Y_{\tau i}$ is the same for all i; that is, equilibrium Big Eight market shares are the same in all i subsectors of the audit market; and

H_{02i}: for subsector i, $Y_{\tau}=Y_{\tau}'$; that is, equilibrium Big Eight market shares remain constant over time.

Model Construction and Test Design

The discussion in Section I implies that Big Eight comparative advantages (and, therefore, equilibrium Big Eight market shares) can be affected by client size, growth, capital market activity, and regulatory status. Therefore, a linearly additive model for $Y_{\tau i}$ can be posited as:

$$Y_{\tau i}=\beta_{0\tau}+\beta_{1\tau}S_{\tau i}+\beta_{2\tau}CM_{\tau i}+\beta_{3\tau}R_{\tau i}+\beta_{4\tau}G_{\tau i}+\epsilon_{\tau i} \quad (1)$$

where

$S_{\tau i}$ = the relative size of clients in market subsector i for time-frame;

$CM_{\tau i}$ = the capital market status of clients in i during τ;

$R_{\tau i}$ = the regulatory status of clients in i during τ;

$G_{\tau i}$ = the relative growth of clients in i during τ; and

$\epsilon_{\tau i}$ = a random error term, distributed approximately normal with[2]

$$E(\epsilon_{\tau i})=0,\ \text{var}(\epsilon_{\tau i})=\sigma^2\left[\frac{n_{0\tau i}+n_{8\tau i}}{n_{0\tau i}\cdot n_{8\tau i}}\right]$$

and cov $(\epsilon_{\tau i},\epsilon_{\tau i}')$ 0 for all $i\neq i'$.

$H_{01\tau}$ implies $\beta_{j\tau}=0$ for $j=1, 2, 3, 4$. Statistical tests of each of these subhypotheses flow from the assumptions made concerning $\epsilon_{\tau i}$, i.e., t-tests are applied to the $\beta_{j\tau}$ estimates resulting from weighted least-squares regressions.[3]

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[1] See the Appendix for an example and discussion of this result.

[2] This variance structure for $\epsilon_{\tau i}$ is consistent with independent binomial distributions for $n_{g\tau i}$ and $n_{L\tau i}$.

[3] Weighted least-squares is preferred to OLS regression because of substantial differences in n_0 and n_8 values across market subsectors (i). The assumption of approximate normality for $\epsilon_{\tau i}$ is actually inappropriate, since $Y_{\tau i}$ is bounded [0, 1]. Nonetheless, logit transformations of the $Y_{\tau i}$ variable produced t-statistics virtually identical to those reported in Section V.

Test results reported in Section IV derive from the following dichotomies for independent variables:

$S_{f\tau}=1$ if client f's annual sales at the beginning of τ exceed the sample median, and 0 otherwise;
$CM_{f\tau}=1$ if client f is publicly-held, and 0 if otherwise;
$R_{f\tau}=1$ if client f is in a regulated industry, and 0 otherwise;[4] and
$G_{f\tau}=1$ if client f's average annual growth during τ exceeds the sample median, and 0 otherwise.

Thus, 16 (2^4) market subsectors are identified for empirical tests.

A parallel model for testing H_{02l} can be posited as:

$$Z_l=Y_{\tau' l}-Y_{\tau l}=\gamma_0+\gamma_1 S_l +\gamma_2 CM_l+\gamma_3 R_l+\gamma_4 G_l+\eta_l \qquad (2)$$

where

τ' = the time-frame from 1973 to 1980;

and

τ = the time-frame from 1965 to 1972.

H_{02l} implies $\gamma_i=0$ for $i=0, 1, 2, 3, 4$. Assuming independence in sampling error between $Y_{\tau' l}$ and $Y_{\tau l}$, statistical tests are once again derived from t-tests applied to weighted least-square estimates of the γ parameters. In this case, tests of the significance of the constant term (γ_0) are germane to the notion of a general audit market shift favoring the Big Eight during the 1970s.

The "equilibrium" approach pursued in these tests is basically an alternative to empirical tests using net client movements to the Big Eight as a dependent variable [Danos and Eichenseher, 1982]. In the latter case, one would attempt to infer relative comparative advantages from the magnitude of net client movements.

We feel the equilibrium approach to be a superior method for two reasons. First, in drawing inferences as to comparative Big Eight advantages, it overcomes the problem of differential impediments to auditor change over audit market subsectors or time-frames. Note, for example, that $\hat{P}_{g\tau l}=.10$ and $\hat{P}_{L\tau l}=.05$ lead to the same $Y_{\tau l}$ value as $\hat{P}_{g\tau l}=.50$ and $\hat{P}_{L\tau l}=.25$, whereas these two sets of auditor change parameters do not imply the same net client movement in τ. In short, net client movements are affected by both long-run equilibrium positions and the rate of adjustment to these positions.[5] The current approach focuses on differences in apparent equilibrium positions, in effect, controlling for differences in rates of adjustment.

Second, the equilibrium approach further allows for predictions of the long-run equilibrium, *per se*. This is not, at least directly, an outcome of the net client movement approach, but such direct predictions are of paramount interest to a wide range of parties interested in predicting or affecting the long-term dynamic structure of the U.S. audit market.

It should, however, be noted that the set and structure of independent variables delineated above are not problem-free. Clearly other client variables such as geographical dispersion and capital structure may affect CPA-firm comparative advantages. In certain cases sales may be a poor surrogate for client size.

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[4] Sample selection procedures insured stability in $CM_{f\tau}$ and $R_{f\tau}$ over time-frames (τ). All sample firms that changed primary industry or capital status from 1964 to 1980 were eliminated from consideration.

[5] Comparisons of net client movements across subsectors or time-frames are also biased by differences in beginning Big Eight market shares, particularly in periods of generalized movement to the Big Eight.

The effects of the specified client variables on Big Eight comparative advantage may not be linearly additive. Nonetheless, we would argue that we have captured at least some of the most obvious determinants of auditor choice (Big Eight comparative advantage).

Sample Selection

The sampling strategy focuses on client industries as the basic units of observations, i.e., instead of sampling across clients independent of industry, specific client industries were selected and 100 percent enumeration was sought within chosen industries. Recent research [Eichenseher and Danos, 1981; Danos and Eichenseher, 1982] indicates probable differences in CPA-firm distributions for client-industry submarkets in the overall U.S. market for audit services.

Six three-digit SIC code client industries were identified for analysis. Three objectives guided the selection of industries: (1) the desire to explore a regulated versus unregulated dichotomy in market conditions; (2) the desire to obtain representative samples of both high and low auditor concentration conditions within both regulated and unregulated industry categories; and (3) the desire to maximize the number of industries sampled given the dual constraints of a certain minimum number of industry observations and limited research resources. Table 1 provides information regarding this sample.

Standard and Poor's *1980 Register of Corporations* provided the starting point for data collection, i.e., all non-subsidiary[6] firms listed in this directory, with one of the above six primary SIC codes and information as to sales and auditor, were identified as the desired sample. Longitudinal tests required client-firm information as of 1964 and 1972. Therefore, earlier editions of Standard and Poor's registers were consulted to obtain this historical information. Also, brief questionnaires were sent to current client-firm officials requesting the prior information. Numbers in the Full Data column of Table 1 indicate firms in each industry for which full information about auditor, size (measured in sales), and capital market involvement (public vs. private) was obtained for each point in time (1964, 1972, and 1980). Overall, complete information was obtained for 43 percent of the desired sample.

Some features of the sampling process should be emphasized. First, as indicated, the sample was not randomly selected although an attempt was made to achieve representativeness along certain dimensions. Inferences from subsequent test results must, therefore, be viewed with caution. Industry groupings underlying the sample selection process (three-digit SIC codes), while not free of potential problems, generally conform to recent research approaches to audit submarket identifications. Second, it should be noted that Standard and Poor's corporate registers capture only firms with annual sales of at least one million dollars. Thus, the domain of inquiry for this research does not encompass the auditor selections by very small client firms, and no inferences regarding this portion of the overall market for audit services are made.

Finally, the loss of sample observations resulting from the lack of client information for 1972 and 1964 may bias subsequent test results. In total, 391 client firms identified in the sample

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[6] Subsidiary firms were not considered due to the potential for other (parent) firms having a substantial impact on these firms' auditor selections.

TABLE 1

LONGITUDINAL SAMPLE

Industries	Three-digit SIC Code	Number of Clients: 1980 Observations[a]	Number of Clients: Full Data Observations	1978 Auditor[b] Concentration Level (H)
Regulated Industries:				
Trucking	421	156	53	.112
Electric Utilities	491	175	109	.239
Fire, Marine, Casualty and Surety Insurance Carriers	633	95	34	.273
Total Regulated		426	196	
Unregulated Industries:				
Sugar and Related Product Producers	206	63	28	.296
Plumbing and Heating Manufacturers	343	92	38	.189
Electrical Goods Wholesalers	506	109	37	.084
Total Unregulated		264	103	
Total Sample		690	299	

[a] Non-subsidiary firms listed in Standard and Poor's *1980 Register of Corporations*, with information given for sales and external auditors.

[b] As reported by Eichenseher [1980].

industries in 1980 were dropped from the analysis for one of four underlying reasons: (1) the firm was formed after 1964; (2) the firm existed in 1964 but was not audited by a CPA firm at that time; (3) the firm has existed and been audited continuously since 1964 but information as to sales and auditor could not be obtained from either Standard and Poor's or direct mail survey; or (4) full information was gathered on the firm, but it changed *CM* category (typically went public) from 1964 to 1980.[7] Partial information from the 1980 S & P *Register* indicates that at least 38 1980 sample firms were formed after 1964. Furthermore, returned (direct) surveys indicated that at least 52 1980 sample firms existing in 1964 were not audited at that time.

The percentage of the other 287 eliminated firms that actually existed in 1964 and were audited from 1964 to 1980 remains unknown. Presumably, some significant percentage of this group of firms is, in effect, eliminated due solely to incomplete information (reason 3 listed above). Subsequent test results must, therefore, be viewed in light of this precisely undeterminable response bias.[8] However, the pattern of auditor selections by this group of 287 firms in 1980 is

[7] Only 14 firms were eliminated due to *CM* category changes.

[8] The response bias is probably more severe for privately-held client firms. After elimination of firms which are known not to have existed or to have been continuously audited over the sample time-frame, 67 percent of publicly-held firms are included in the "full data" sample, compared to only 42 percent of privately-held firms.

TABLE 2

DESCRIPTIVE STATISTICS FOR LONGITUDINAL SAMPLE

		1965–1972				1973–1980				
			Big Eight Percent		Apparent Big Eight		Big Eight Percent		Apparent Big Eight	Δ Equilib-
Client Dimension	Level	N	1965	1972	Equilibrium	N	1973	1980	Equilibrium	rium
Size	Large	149	74.5	78.5[a]	89.8	149	79.2[a]	88.6	96.8	+7.0
	Small	150	29.3	38.0[a]	56.8	150	37.3[a]	44.7	73.5	+16.7
Capital Market	Public	127	75.6	81.1	93.3	127	81.1	86.6	95.1	+1.8
	Private	172	34.3	41.3	58.6	172	41.3	51.7	83.1	+24.5
Industry	Regulated	196	57.1	62.2	78.0	196	62.2	72.4	97.2	+19.2
	Unregulated	103	41.7	50.5	74.1	103	50.5	55.3	69.6	−4.5
Growth	High	149	45.0	55.7[a]	88.0	149	65.8[a]	72.5	95.5	+7.5
	Low	150	58.7	60.7[a]	67.0	150	50.7[a]	60.7	83.0	+16.0
Overall		299	51.8	58.2	77.0	299	58.2	66.6	89.3	+12.3

	χ^2 Statistics for Tests of Independence ($DF=1$)	
Across Category Bivariate Associations	1965–1972	1973–1980
Size vs. Capital Market	77.86*	73.79*
Size vs. Industry	3.18	7.61*
Size vs. Growth	2.09	7.39*
Capital Market vs. Industry	9.85*	9.85*
Capital Market vs. Growth	0.29	23.72*
Industry vs. Growth	7.60*	47.52*

[a] Percentages are different for 1972 and 1973 because size and growth categories are redetermined at the beginning of 1973.

[*] Significant at .05 level.

TABLE 3
CROSS-SECTIONAL TEST RESULTS

Parameter	*$\tau=1$ (1965 to 1972)*	*$\tau=2$ (1973 to 1980)*
β_0 (Constant)	+.361** (+2.28)	+.708** (+5.94)
β_1 (Size)	+.308* (+1.82)	+.045 (+0.30)
β_2 (Capital market)	+.147 (+0.81)	−.001 (−0.01)
β_3 (Regulation)	−.179 (−1.07)	+.212 (+1.38)
β_4 (Growth)	+.397** (+2.42)	+.076 (+0.49)
R^2	.665	.806
DF	9	6
F-stat	4.46**	6.22**

(*t*-statistic)
* $\alpha \leq .10$ (two-tailed tests)
** $\alpha \leq .05$ (two-tailed tests)

virtually identical to the pattern exhibited by the 299 full data firms in 1980.

IV. LONGITUDINAL TEST RESULTS

Table 2 provides sample summary statistics for the longitudinal sample. Three features of this table deserve comment before attention is shifted to formal tests regarding model parameters. First, in both time-frames, actual Big Eight net client gains appear in every line of Table 2. Second, even given these gains, apparent Big Eight equilibrium positions still subsequently exceed obtained positions at the period end in most client environments. Finally, the dimensions delineated in the table are far from independent. In particular, large clients are much more likely than small clients to be publicly-held. Strong positive relationships also appear in the 1973 to 1980 time-frame between (1) growth and publicly-held capital market status, and (2) growth and operation in a regulated industry. Thus, the effects of individual client dimensions are better inferred from the following multivariate tests than from the broad comparisons available in Table 2.

Table 3 provides results of tests of generic hypothesis $H_{01\tau}$. From auditor change data from 1965 to 1972, support is found for Big Eight comparative advantages in auditing larger and growing client firms. While the overall model remains significant in the 1973 to 1980 time-frame, no individual model variable attains statistical significance. This lack of individual variable significance may result from more severe problems in multicollinearity in the latter period, particularly the stronger positive association between regulation and growth. At any rate, auditor change data from 1973 to 1980 indicate uniformly high (at least 70 percent) long-run Big Eight market share equilibrium in all identified market subsectors.

TABLE 4

TESTS OF CHANGES IN BIG EIGHT EQUILIBRIUM

Parameter	*Estimated Coefficient*	*t-value*
γ_0 (Constant)	+.136	+0.72
γ_1 (Size)	−.229	−1.04
γ_2 (Capital market)	−.051	−0.21
γ_3 (Regulation)	+.826**	+3.33
γ_4 (Growth)	−.684**	−2.94
R^2	.773	
DF	5	
F-stat	4.26*	

* $\alpha \leq .10$ (two-tailed tests)
** $\alpha \leq .05$ (two-tailed tests)

Table 4 provides the results of tests of generic hypothesis H_{02i}. Support for an upward shift in long-term Big Eight equilibrium position is found almost exclusively in the context of clients in regulated industries. The significant negative coefficient for client growth in this model (γ_4) parallels the loss of significance for β_4 from $\tau=1$ and $\tau=2$ as shown in Table 3.

Taken in total, the results of longitudinal empirical tests call into question some popular notions concerning the U.S. audit market. While Big Eight CPA firms continue to have a higher market share position for larger client firms in 1980 [Dopuch and Simunic, 1980], an examination of auditor changes over the previous 16 years indicates greater Big Eight advantages in auditing such clients only for the 1965 to 1972 period. Auditor change data, particularly from 1973 to 1980, indicate a uniform long-term aggregate Big Eight equilibrium over all client types that appears substantially higher than that obtained by 1980. Except in the case of regulated industries, underlying changes in technology (supply) and demand during the 1970s do not appear to have materially altered this long-term equilibrium Big Eight position.

V. WITHIN BIG EIGHT ANALYSIS

The preceding empirical results indicate, based on auditor change data in six client industries from 1965 to 1980, uniformly high and perhaps increasing aggregate long-term Big Eight market share positions across time and audit submarkets. Perhaps of greater interest are recent changes in market share positions within this group of large CPA firms. As the Big Eight as a group increases its market share throughout the U.S. audit market, attention needs to be focused on within-group dynamics to address issues such as competitive pressures and scale opportunities.

To this end, a more comprehensive client sample over a longer time-frame was drawn. Auditor identities listed in *Standard and Poor's Register of Corporations* for all U.S. firms in ten industries were obtained for four points in time: 1950, 1960, 1970, and 1980. The industry categories employed generally conform to industry classifications employed by Standard and Poor's and are typically broader than the three-digit SIC code categories listed in Table 1. Table 5 lists these industries and provides information about the obtained samples.

Several features of these samples

TABLE 5
COMPREHENSIVE SAMPLES

		1950		1960		1970		1980	
Industry	*SIC Codes*	*N*	*Big Eight Percent*	*N*	*Big Eight Percent*	*N*	*Big Eight Percent*	*N*	*Big Eight Percent*
Apparel	23X	222	20.3	248	21.0	234	31.6	732	29.8
Automotive	371	315	49.2	318	55.7	124	63.7	292	62.0
Electrical Equipment	36X (except 363, 366)	250	47.6	322	50.9	414	58.0	938	52.5
Industrial Machinery	356	377	44.8	482	55.4	154	70.8	409	60.1
Oil and Gas*	131, 291	223	47.5	228	69.3	140	81.4	332	73.2
Paper Products	26X	261	36.8	282	46.5	258	58.9	577	51.1
Printing and Publishing	27X	263	26.6	322	31.4	366	50.0	1,153	47.2
Railroads*	40X	87	60.9	67	76.1	40	90.0	100	89.0
Utilities*	491, 492, 493	472	71.0	389	83.0	259	88.0	447	76.5
Trade	5XX	386	37.6	389	47.3	925	57.8	3,118	48.3
Overall		2,856	45.3	3,047	52.8	2,914	60.1	8,098	51.3

* Deemed to be regulated industries in subsequent analysis.

require consideration. First, given no or incomplete information, particularly in the earlier data sources, no attempt was made to identify several client characteristics discussed in Section I. In particular, client growth and capital market activity are ignored, as is size except for an extension described below related only to the 1980 sample. Second, the sample does not capture all auditor/client relationships in the targeted industries. Particularly in the earlier data sources, many corporate auditor identities are not provided.[9] Finally, certain problems in sample comparability across time exist. Clearly, the 1980 sample is drawn from a base 1980 Standard and Poor's population substantially different for the earlier base populations. In general, throughout the 30-year period from 1950 to 1980, Standard and Poor's has captured firms with revenues at least equal to one million dollars. Given growth in the U.S. economy and non-trivial inflation, listings by this source have increased three-fold from 1950–1980. Thus, the 1980 sample contains a much higher percentage of small client firms than earlier samples. The decline in overall Big Eight percentage from 1970 to 1980 must be considered in the light of both this fact and the changes in industry weightings from 1970 to 1980.

Table 6 provides four-firm within-Big Eight sample concentration ratios (i.e., the percentage of sample Big Eight clients audited by the four most active Big Eight firms) in each of the sample industries at the four points in time.

At least in terms of client percentages, Table 6 indicates a general leveling-out

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[9] Auditor identities are missing for approximately 40 percent of firms listed in *Standard and Poor's* in 1950. This figure declines to less than 20 percent for the 1980 edition.

TABLE 6

WITHIN BIG EIGHT FOUR-FIRM SELLER CONCENTRATION RATIOS ACROSS INDUSTRIES AND TIME

Industry	*Time* *1950*	*1960*	*1970*	*1980*	*Change 1950 to 1980*
Unregulated:					
Apparel	.733	.750	.649	.702	−.031
Automotive	.761	.757	.633	.552	−.209
Electrical Equipment	.681	.671	.646	.624	−.057
Industrial Machinery	.775	.697	.633	.654	−.121
Paper Products	.740	.679	.671	.651	−.089
Printing & Publishing	.814	.743	.667	.562	−.252
Trade	.752	.712	.583	.624	−.128
Average Unregulated	.751	.716	.640	.624	−.127
Regulated:					
Oil & Gas	.689	.690	.675	.704	+.015
Public Utilities	.904	.824	.842	.825	−.079
Railroads	.774	.863	.861	.831	+.057
Average Regulated	.789	.792	.793	.787	−.002
Overall Average	.762	.739	.686	.673	−.089

of within-Big Eight market shares over the past 30 years. In particular, the percentage of sample Big Eight clients audited by the four Big Eight firms with the most (sample) clients decreased in each of the seven unregulated industries from 1950 to 1980.[10] This leveling-out effect appears much less obvious in regulated industries, supporting the notion that scale effects still serve to differentiate among Big Eight firms in the regulated client environment.

These results must, however, be viewed with caution, for the relative client losses by the top four firms apparent in Table 6 may be offset by movements of larger client firms to these industry leaders. Higher measures of within-Big Eight auditor concentration than indicated in Table 6 might result if clients were adequately weighted according to audit fees. To at least partially mitigate potential client size biases, the 1980 sample was split into clients with more and less than ten million dollars in reported revenues for 1980. Table 7 provides a separate analysis for each client group.

Three points bear mentioning. First, the "large" sample for 1980 offers a better comparison with the 1950 sample given the S&P population expansion discussed above. Thus, the "large" 1980 67 percent Big Eight client figure (Table 7) should be contrasted to the 45.3 percent

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[10] The four leading Big Eight firms were identified separately for each industry at each point in time. Within-industry ranks for Big Eight firms remained relatively constant over the 30-year period—the mean (Spearman) rank correlation coefficient between 1950 and 1980 positions was +.56 across our ten sample industries.

TABLE 7
SUBGROUPS OF THE 1980 SAMPLE

	Smaller Clients Client firms with Annual Revenues<$10M			*Larger Clients Client firms with Annual Revenues≥$10M*		
Industry	*N*	*Big Eight Percent*	*Within-Big Eight Auditor CR4*	*N*	*Big Eight Percent*	*Within-Big Eight Auditor CR4*
Unregulated:						
Apparel	491	20.8	.686	241	48.3	.709
Automotive	133	43.6	.655	159	77.4	.593
Electrical Equipment	602	41.7	.606	336	71.7	.643
Industrial Machinery	258	50.0	.643	151	77.5	.667
Paper Products	343	38.2	.679	234	70.2	.648
Printing & Publishing	836	36.4	.572	317	75.9	.603
Trade	1,277	34.5	.646	1,841	57.8	.623
Average Unregulated		37.9	.641		72.7	.641
Regulated:						
Oil & Gas	158	53.2	.774	174	91.4	.667
Public Utilities	114	42.1	.771	333	88.3	.833
Railroads	51	82.4	.833	49	95.9	.896
Average Regulated		59.2	.793		91.9	.799
Total Sample	4,263	37.3		3,835	67.0	
Overall Average			.687			.688

overall Big Eight client percentage in 1950 (Table 5) in gauging overall Big Eight growth from 1950 to 1980.

Second, the virtually identical results for within-Big Eight four-firm concentration measures (CR4) across client size groups in 1980 indicate that the trends in Table 6 are not an artifact of the expansion of the S&P sample from 1950 to 1980. The "large" sample results for within-Big Eight concentration levels in 1980 still indicate lower levels than those observed in the 1950 sample. Additionally, high rank-order correlations between "large" and "small" sample Big Eight CPA firm ranks in each industry (mean $r_s = +.60$) support the notion that within-Big Eight client distributions in an industry are largely independent of client size. Thus, the concentration measures reported in Table 6 may approach "true" measures, based on audit fees, which are highly correlated with client size [Simunic, 1980].[11]

Finally, a size effect more striking

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[11] Note that client distributions independent of size within each industry do not imply overall client distributions independent of size. CPA-firm industry specialties need not be independent of the average size of client firms in each industry and, indeed, Harris [1981] indicates client size differentials for Big Eight CPA firms.

than that pointed to in earlier research [Dopuch and Simunic, 1980] is evident in Table 7. Big Eight clients account for 67 percent of our large firm sample in 1980, but only 37 percent of the small firm sample. While this differential is affected both by size and other factors correlated with size (regulation and public trading of securities), it does point to fundamental differences in market structure if the audit market is partitioned based on buyer (client) size. Given the results of Section IV (Table 3), it can be argued that these differences center on the (adjustment) process by which Big Eight comparative advantages are worked out in the marketplace, rather than greater Big Eight advantages in auditing large client firms.

VI. CONCLUDING REMARKS

This study has examined changes in Big Eight market share positions from two points of view: (1) by tracking auditor changes of a longitudinal sample of 299 client firms from 1965 to 1980; and (2) by observing Big Eight client percentages in a larger but varying sample of U.S. corporations every ten years from 1950 to 1980.

Results of the first empirical approach provide support for a long-term adjustment to fairly high levels of aggregate Big Eight market shares in all audit submarkets. The second approach, on the other hand, indicates increasing competitive pressures among Big Eight firms, while evidence of substantial scale economies appears in the regulated client environment.

Taken in total, these results imply countervailing trends towards concentration in the U.S. audit market. While large CPA firms in general may come to dominate most segments of this market, limits on concentration in any given market segment appear as large firms compete with each other. Thus, the evolution of the Big Eight can be viewed as either pro- or anti-competitive. Whatever the case may be, linkages between increasing Big Eight shares and recent public policy deliberations (GAAP or GAAS development) is far from obvious. A *caveat* to this general scenario must be borne in mind. For regulated client industries, evidence as to increasing competition among large CPA firms is lacking. Presumably, the scale opportunities in such environments confer competitive advantages on a small subset of large firms. In this context, limits to auditor concentration are not obvious. However, such concentration flows from client regulation and any policy prescriptions to reduce this concentration may prove inefficient.

APPENDIX

This appendix illustrates by numerical example the convergence of Big Eight market share to the $\frac{P_{g\tau}}{P_{g\tau}+P_{L\tau}}$ ratio (Section III), given stability in the gain and loss parameters, $P_{g\tau}$ and $P_{L\tau}$, over time, τ. Assume, for simplicity's sake, that $n_0+n_8=4$, i.e., a total market of four clients to be divided between large and small audit firms. Table 8 tracks the future distribution of $n_{8\tau}$ conditioned on the original large firm position (n_{80}) and varying levels for stable P_g and P_L parameters:

TABLE 8

FUTURE BIG EIGHT POSITIONS

Assumed Parameters			*Expected Value of $n_{8\tau}$ at:*				
n_{80}	P_8	P_L	$\tau=1$	$\tau=2$	$\tau=3$	$\tau=4$	$\tau=5$
0	.2	.1	0.80	1.36	1.75	2.03	2.22
0	.4	.2	1.60	2.24	2.50	2.60	2.64
0	.8	.4	3.20	2.56	2.69	2.66	2.67
1	.2	.1	1.50	1.85	2.09	2.27	2.39
1	.4	.2	2.00	2.40	2.56	2.62	2.65
1	.8	.4	3.00	2.60	2.68	2.66	2.67
2	.2	.1	2.20	2.34	2.44	2.51	2.56
2	.4	.2	2.40	2.56	2.62	2.65	2.66
2	.8	.4	2.80	2.64	2.67	2.67	2.67
3	.2	.1	2.90	2.83	2.78	2.75	2.72
3	.4	.2	2.80	2.72	2.69	2.68	2.67
3	.8	.4	2.60	2.68	2.66	2.67	2.67
4	.2	.1	3.60	3.32	3.12	2.99	2.89
4	.4	.2	3.20	2.88	2.75	2.70	2.68
4	.8	.4	2.40	2.72	2.66	2.67	2.67

The expected future values of n_8, computed from repeated application of binomial random variables $n_{8\tau}$ and $n_{L\tau}$, converge on 2.67 in all cases. This 2.67 value for $n_{8\tau}$ is also the ⅔ Big Eight market share implied by the $\frac{P_8}{P_8+P_L}$ ratio in all cases. More generally, it can be shown analytically that, in the limit (as $\tau\rightarrow\infty$):

$$n_{8\tau}\sim B[N,\frac{P_8}{P_8+P_L}]$$

where N=the total number of clients available in a given market (subsector). Or, alternatively:

$$\lim_{\tau\rightarrow\infty} E(MS_\tau)=\frac{P_8}{P_8+P_L}$$

where MS=Big Eight market share.

Note two properties of this condition. First, the speed of adjustment in the market to $\frac{P_8}{P_8+P_L}$ increases, in general, with increases in the (P_8+P_L) value, i.e., more frequent auditor change implies a quicker adjustment to (presumably stable) underlying conditions of comparative advantages of CPA firms. Second, the convergence of

MS on $\frac{P_g}{P_g+P_L}$ relies, in fact, only on the relative stability of the P_g and P_L parameters. If

$$P_{g\tau}=\alpha_\tau P_g$$

and

$$P_{L\tau}=\alpha_\tau P_L,$$

the above result still holds, although the stream of α_τ parameters does affect the speed of convergence of *MS* on $\frac{P_g}{P_g+P_L}$.

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Measurement of Financial Leverage in the Presence of Unfunded Pension Obligations

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ABSTRACT: This study examines empirically whether unfunded vested pension obligations that are not recorded in corporate balance sheets are viewed as a form of debt by the capital market participants when assessing firm risk. This is accomplished by using a model developed by Hamada [1972] which relates the systematic risk of a firm to its financial risk and business risk. The explanatory power of the model is improved when unfunded vested pension liabilities are included in the measurement of financial leverage. Furthermore, the effect of unfunded vested pension liabilities on market-perceived risk of the firm is not significantly (statistically) different from that of debt and other liabilities.

ONE of the most important issues in accounting today relates to accounting for pension liabilities.[1] Issues to be resolved include whether there is an unrecorded liability for pensions under existing generally accepted accounting principles. If there is an unrecorded liability, what part of the pension obligation not currently recognized as a liability should be included on the balance sheet of the employer?

Whether unfunded pension liabilities are the liabilities of the employer is a controversial issue. Some argue that the pension liability is too uncertain and too difficult to measure because several future events must be estimated to compute the amount of the liability and these estimates will change over time. Therefore, the pension liability should be excluded from the balance sheet. On the other hand, problems involved in forming estimates and projections are not unique to pensions. Accounting involves many estimates. Preparation of Reserve Recognition Accounting (RRA) data,

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[1] Since February 1981, the FASB has issued two Discussion Memoranda [FASB 1981; 1983], a document entitled "Preliminary Views" [1982], two Exposure Drafts [1985 a,b] and SFAS No. 87 [1985c] and SAFS No. 88 [1985d] in connection with issues related to employers accounting for pensions and other post-employment benefits.

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for example, involves making estimates of future events that appear no less uncertain than those involved in computing the pension liability. Yet firms have been preparing RRA data since 1978. Not only have firms been producing these data, but Bell [1983] found stock market reactions to the release of this information. Further, Bell, Boatsman, and Dhaliwal [1985] present empirical evidence that market participants perceive RRA data as no less informative than historical cost earnings numbers.

Furthermore, the relevance of the pension liability information may be sufficient to compensate for lack of precision. FASB Statement of Concepts No. 2 [FASB, 1980a] suggests that some tradeoff may exist between the degree of reliability and relevancy of information. ASOBAT [AAA, 1966] listed relevancy as a primary goal in standard setting, and FASB Statement of Concepts No. 2 mentions it as a desirable characteristic of financial disclosure. These views suggest that an imperfect estimate of pension obligations might be a more useful measure of the pension liability than not recognizing the liability.

Various additional pro and con arguments regarding the nature of unfunded pension liabilities appear in the accounting literature. Lucas and Hollowell [1981] present a good summary of these arguments.

If unfunded vested pension obligations of a firm constitute a liability, one would expect that, in an efficient capital market, this liability would affect the market value and the market-perceived risk of the firm in the same manner as debt and other liabilities. This study empirically examines whether capital market participants regard the unfunded vested benefits under a defined benefit pension plan, a component of unrecorded pension liability, as equivalent to debt. Specifically, the effect of unfunded vested pension obligations on market-perceived risk of the firm is investigated.[2]

The remainder of this paper is organized as follows. The next section presents the model to be used to empirically examine the debt equivalency of unfunded pension obligations. Then the test hypotheses, sample selection, research method, and results are presented. The final section presents concluding remarks.

MARKET RISK AND DEBT OF A FIRM

Within the context of capital asset pricing theory, systematic risk, β_i, is the relevant measure of market risk. It is defined as follows:

$$\beta_i = \frac{Cov(\tilde{R}_i, \tilde{R}_m)}{Var\,(\tilde{R}_m)}, \qquad (1)$$

where

$\tilde{R}_i$ = one period return on firm i's common stock, and

$\tilde{R}_m$ = one period return on market portfolio.

Hamada [1972] relates this systematic risk of a firm to its financial risk and business (or operating) risk. Incorporation of corporate taxes into Hamada's model leads to the following relationship presented in Rubinstein [1973, p. 178]:

$$\beta_i = \beta_{oi}\,[1 + (1 - \tau_i)D_i/E_i], \qquad (2)$$

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[2] Since 1974, the Employee Retirement Security Act (ERISA) rules mandate that all private pensions provide vesting of any employee who meets certain conditions of age and/or years of service. Vested benefits are the benefits to which the employee is entitled even if he subsequently leaves the company before retirement age.

where

τ_i = the firm's effective tax rate,

$\frac{D_i}{E_i}$ = the firm's debt to equity ratio, and

β_{oi} = the firm's operating risk.

Operating risk, β_{oi}, is the systematic risk that would be associated with firm i if the firm had no debt in its capital structure and hence no financial risk. Operating risk arises from the risk inherent in the investment and production decisions of the firm, and equation (2) shows how this component of risk interacts with the firm's financial leverage to determine systematic risk.

Each determinant of market risk in equation (2) is measurable except for the operating risk variable, β_{oi}. Bowman [1979] has shown that under the appropriate conditions, accounting beta, which is expressed as the covariability of a firm's accounting earnings before interest and taxes with the accounting earnings of the market portfolio, can surrogate for the business risk of an unlevered firm. He shows that accounting beta, β_{Ai}, of a firm is related to its systematic risk as follows:

$$\beta_i = \frac{E_m}{E_i}\beta_{Ai}, \qquad (3)$$

where $\beta_{Ai} = Cov(X_i, X_m)/Var(X_m)$, m denotes the market portfolio, and X is accounting earnings. Thus, accounting beta based on accounting earnings before interest and taxes is an obvious surrogate for operating risk.[3] Substituting accounting beta, β_{Ai}, for operating risk, β_{oi}, model (2) becomes

$$\beta_i = \beta_{Ai}[1 + (1 - \tau_i)\frac{D_i}{E_i}] \qquad (2')$$

Empirical evidence indicates that market risk, β_i, is related to other variables such as earnings variability, dividends, and size [Beaver, Kettler and Scholes, 1970]. However, Bowman [1979] shows that there is no theoretical relationship between these variables and market risk if one uses the assumptions of the capital asset pricing model and assumes that firms can borrow and lend at a risk-free interest rate.

Model (2′) is used in this study to examine whether capital market participants view unfunded vested pension obligations as corporate debt when they assess firm market risk. In this model, financial leverage is one determinant of market risk; if unfunded vested pension liabilities are viewed as debt, they should be included in the measurement of financial leverage. That is, inclusion of unfunded pension liabilities in the measurement of financial leverage should result in an increase in the explanatory power of the above model.

It is possible that unfunded pension obligations are considered a form of debt that is not strictly equivalent to other forms of debt. In this case, a dollar of pension liabilities may affect the systematic risk of the firm differently than a dollar of conventional debt.

The following regression was run to determine whether unfunded vested pension liabilities are considered a form of corporate debt and, if so, whether they are considered equivalent to debt.

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[3] Lev [1974] suggests the ratio of fixed cost to variable cost per unit as another candidate for a measure of operating risk, whereas Subrahmanyam and Thomadakis [1980] present the ratio of capital to labor of the firm as a measure of operating risk. However, the measurement of either one of these variables presents a serious problem.

$$\beta_i=b_0+b_1\beta_{Ai}+b_2\beta_{Ai}(1-\tau_i)(\frac{D_i}{E_i})+b_3\beta_{Ai}(1-\tau_i)(\Delta\frac{D_i}{E_i})+\epsilon_i \tag{4}$$

where

$$\Delta\frac{D_i}{E_i}=(\frac{D_i}{E_i})_A-\frac{D_i}{E_i},$$

$$(\frac{D_i}{E_i})_A=\frac{D_i+(1-\tau_i)(\text{Unfunded vested pension liabilities})}{E_i-(1-\tau_i)(\text{Unfunded vested pension liabilities})}$$

and other variables are as defined earlier.

In essence, model (4) is an operationalization of model (2′) with an added term to include unfunded vested pension liabilities as a form of debt.

There is a key difference between debt and the pension obligation. Contributions made by a firm to discharge its pension obligations are tax-deductible, whereas the principal repayment of debt is not tax-deductible. Only the interest expense related to debt is tax-deductible. Therefore, as noted by Daley [1984], among others, $(1-\tau_i)$ times the unfunded vested pension obligation is an appropriate measure of the debt equivalence of firm *i*'s unfunded vested pension obligations.

If unfunded vested pension liabilities are viewed as a form of debt by the capital market participants, the coefficient b_3 in model (4) should be positive and statistically significant. Further, if these liabilities affect the market-perceived risk of the firm in the same manner as debt and other liabilities, then b_3 should be equal to b_2.

SAMPLE SELECTION

To select a sample, firms with December 31 fiscal year-end were identified from a list of companies whose 10-Ks are available in our library.[4] From this list, a firm was randomly selected and its average debt (total liabilities) to equity ratio over the years 1976 through 1979 was computed.[5] The book value of debt was used in this calculation, whereas the market value of equity was used. Then, from the pension footnote in the firm's 10-K, the amount of unfunded vested pension benefits at the balance sheet date for each of the years 1976–1979 was determined. The amount of unfunded vested pension liability at the balance sheet date was multiplied by one minus the average effective tax rate of the firm over the years 1976 through 1979. Hereafter, this product is referred to as the tax-adjusted unfunded vested pension liability (TUVPL). Two alternative tax rates to be described later also were used for computing TUVPL. The debt to equity ratio of the firm at the date of each of the four balance sheets was recomputed after adding TUVPL to the total liabilities and subtracting it from the equity reported on the balance sheet. This recomputed measure of debt to equity is the adjusted (for unfunded vested pension liabilities) debt to equity

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[4] The December 31 year-end restriction should increase the chances that actuarial assumptions were made in the same year.

[5] Selection of the time period of this study, years 1976–1979, was basically arbitrary. By 1976, a large number of firms were disclosing pension information in their 10-Ks. This period was considered long enough to provide enough observations for the estimation of market risk, and short enough to assume stationarity of beta over this period.

TABLE 1

INDUSTRY REPRESENTATION OF THE SAMPLE

Industry	*Number of Firms*	*Industry*	*Number of Firms*
Aerospace	1	Machine Tools	2
Aluminum	2	Machinery—Construction	1
Auto Parts & Accessories	2	—Industrial	1
Auto Trucks	2	—Specialty	2
Cement	2	—Steam Generating	1
Chemicals	1	Motor Vehicles	2
Conglomerates	1	Paper	2
Containers—Metal & Glass	3	Plastic Products	2
Cosmetics	1	Railroad Equipment	1
Electric & Elec. Leader	1	Refractories	2
Elec. Industrial Controls	1	Rolling & Drawing Non-Ferrous Metals	3
Engineering Lab. & Res. Eq.	1	Steel	8
Fabricated Metal Products	1	Tire & Rubber Goods	4
Fabricated Rubber Products	1	Tobacco-Cigarette Mfg.	2
Hardware	2		

ratio, $[(\frac{D_i}{E_i})_A]$, described earlier. A firm was included in the study sample if its average adjusted debt-equity ratio over the years 1976 through 1979 was greater than 110 percent of the unadjusted average debt-equity ratio over the same period. Thus, a firm was included in the sample only if it had material unfunded vested pension liabilities over the period of the study. The sample selection process was continued until a sample of 55 such firms was obtained.

It is important from a research design point of view to focus on firms with substantial amounts of unfunded pension liabilities. This restriction enhances the chances of observing a relationship between systematic risk and unfunded pension liabilities if the relationship exists. Further, a sample of 55 firms was considered adequate given the number of independent variables in the model used in the study. Industry classification of this sample is presented in Table 1.

TEST HYPOTHESES AND RESULTS

As mentioned previously, regression model (4) was used to address whether unfunded vested pension liabilities of a firm affect the market-perceived risk of the firm in the same manner as debt and other liabilities.

The coefficient b_3 in model (4) is predicted to be positive and statistically significant if unfunded vested pension liabilities are viewed as a form of debt by capital market participants. Further, if these liabilities affect the market-perceived risk of the firm in the same manner as debt and other liabilities, the model predicts that b_3 will be equal to b_2.

Measurement of Variables

β_i: The dependent variable, β_i, in model (4) was measured by using the following market model which assumes that security returns follow a multivariate normal distribution:

$$\tilde{R}_{it}=\alpha_i+\beta_i\tilde{R}_{mt}+v_{it}, \quad (5)$$

TABLE 2

DESCRIPTIVE STATISTICS—INDEPENDENT VARIABLES

Variable	*Mean*	*Standard Deviation*	*Range*
D/E	1.11	1.03	0.13- 5.86
$(D/E)_A$	1.36	1.33	0.19-20.21
β_{Ai}	0.93	1.07	0.22- 3.14
τ_{i1}	0.34	0.51	0.13- .47
τ_{i2}	0.36	0.47	0.11- 0.46

where

$\tilde{R}_{it}$=rate of return of security i over month t,

$\tilde{R}_{mt}$=rate of return on the market portfolio over month t, Standard and Poor's 500 firms were used as market index,

$\beta_i=\text{Cov}(\tilde{R}_{it}, \tilde{R}_{mt})/\text{Var}(\tilde{R}_{mt})$, the market risk of firm i, and

ν_{it}=disturbance term of security i in month t, $E(\nu_{it})=0$.

β_i for each firm was estimated by running a least-squares regression of equation (5) using monthly returns for January 1976 through December 1979. Monthly return data were obtained from the tapes constructed by the Center for Research in Security Prices (CRSP).

β_{Ai}: To compute accounting beta, β_{Ai}, the accounting return of firm i in period t, AR_{it}, was defined as follows:

$$AR_{it}=\frac{\text{Firm } i\text{'s period } t \text{ income before interest and tax expense}}{\text{Total assets of firm } i \text{ at the beginning of period } t}$$

The accounting return for the market portfolio (S&P 400), AR_{mt}, was similarly computed. Accounting beta, β_{Ai}, was measured by $Cov(\text{AR}_{it}, AR_{mt})/Var(AR_{mt})$ over the 20-year period ending December 31, 1983.[6]

τ_i: Three different measures of the effective tax rate were used in this study. The first measure, τ_{i1}, was the effective tax rate reported in a firm's 10-K report. Since SEC Accounting Series Release No. 149 requires reconciliation between effective and statutory federal corporate income tax rates, the effective tax rate for almost all firms was available in the 10-K and annual reports. Sometimes a firm gave only a verbal explanation for the difference between effective and statutory tax rates. In such a case, a firm's effective tax rate, τ_{i1}, for a given year was computed as follows:

$$\tau_{i1}=\frac{\text{Income tax expense excluding changes in deferred taxes}}{\text{Pretax income}}$$

Data for the above computation were obtained from the firm's income statement and balance sheet.

The second measure of the effective

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[6] β_{Ai}, as measured here, is a crude measure of the operating risk of the firm during the period of this study. First, there is an implicit assumption that the operating risk of the firm was constant during the 20-year estimation period. Second, it is assumed that production/investment activities of the firm are not affected by the existence of debt in its capital structure. To the extent that either or both of these assumptions do not hold, the β_{Ai} can be viewed only as an approximate measure of the operating risk of the firm.

In an earlier version of the paper, β_{Ai} was measured over a ten-year period. The results obtained using that measure did not differ significantly from those reported here.

TABLE 3

CORRELATION MATRIX OF INDEPENDENT VARIABLES IN MODEL (4)

	β_{At}	$\beta_{At}(1-\tau_{t1})\frac{D_t}{E_t}$	$\beta_{At}(1-\tau_{t1})\Delta\frac{D_t}{E_t}$
β_{At}	1		
$\beta_{At}(1-\tau_{t1})\frac{D_t}{E_t}$	.537	1	
$\beta_{At}(1-\tau_{t1})\Delta\frac{D_t}{E_t}$	.496	.422	1

tax rate, τ_{t2}, was defined as the total tax expenses divided by pre-tax income. In addition to using the above two measures of the effective tax rate, an attempt was made to estimate the marginal tax rate. However, because of problems associated with obtaining data to compute marginal tax rates, we assumed that marginal tax rates were equal to the maximum federal tax rate in each year. Under this assumption, every firm's marginal tax rate was the same. Hence, the regression was run without the factor $(1-\tau_t)$ in equation (4).

$\frac{D_t}{E_t}$, the debt to equity ratio of the firm, was measured as the average total liabilities to equity ratio over the years 1976 through 1979. The book value of debt was used in this calculation whereas the market value of equity was used.

$(\Delta\frac{D_t}{E_t})$ was defined as the difference between the adjusted (for unfunded vested pension liabilities) debt to equity ratio, $(\frac{D_t}{E_t})_A$, and $\frac{D_t}{E_t}$. Measurement of $(\frac{D_t}{E_t})_A$ is described in the sample selection section.

Table 2 presents descriptive statistics on the sample values of the independent variables.

If there is multicollinearity between the independent variables, it is difficult to interpret the coefficient b_3 in model (4). The correlation matrix of the independent variables in model (4) for the sample firms is presented in Table 3. The τ_{t1} measure of the tax rate was used in computing this correlation matrix. Coefficients of correlation range from 0.422 to 0.537. Comparable correlation coefficients were determined by using τ_{t2} and τ_{t3} measures of the tax rate.

According to Judge et al. [1980, p. 459], a rule of thumb for a serious multicollinearity problem is when the correlations among independent variables are higher than 0.8. This criterion implies that multicollinearity is not likely to present a serious problem in interpreting the coefficients of regression (4). To the extent multicollinearity is a problem, the result of this test cannot be interpreted unambiguously.

TABLE 4
RESULT OF REGRESSION ANALYSIS OF EQUATION (4)

	Coefficients				
Tax Rate	b_0	b_1	b_2	b_3	*Adjusted* R^2
τ_{i1}	0.551 (4.19)	0.132 (1.81)	0.294 (1.99)	0.271 (1.79)	0.27
τ_{i2}	0.891 (4.13)	0.160 (1.77)	0.241 (1.86)	0.227 (1.91)	0.24
τ_{i3}	.591 (4.31)	0.151 (1.78)	0.488 (2.00)	0.446 (1.66)	0.20

t-statistics are shown in parentheses.

RESULTS

Results of regression analysis using equation (4) and three different tax rate measures are presented in Table 4. In all three models, the sign of the coefficient b_3 is positive and the coefficient is statistically significant at the .05 level. These results are consistent with the view that market participants regard the unfunded pension liabilities as a form of debt.

Further, the null hypothesis that $b_2=b_3$ was tested against the alternative that $b_2 \neq b_3$. This was accomplished by examining whether the inclusion of the restriction $b_2=b_3$ in model (4) results in a significant reduction in the explanatory power of the model. First, the error sum of squares for the full model (4), $SSE(F)$, was obtained. Next, the error sum of squares of the following restricted model, $SSE(R)$, was obtained:

$$\beta_i=b_0+b_1\beta_{Ai}+b_2\beta_{Ai}$$

$$(1-\tau_i)(\frac{D_i}{E_i}+\Delta\frac{D_i}{E_i})+\epsilon_i$$

Using $SSE(R)$ and $SSE(F)$ and the corresponding degrees of freedom, the following test statistic was computed:

$$F^*=\frac{SSE(R)-SSE(F)}{(n-3)-(N-4)}\div\frac{SSE(F)}{n-4}$$

where n = number of observations (55 in this study).

Under the null hypothesis that $b_2=b_3$, the test statistic F^* follows the $F(1, n-4)$ distribution. The null hypothesis, $b_2=b_3$, could not be rejected at any reasonable level of significance in any of the three versions of model (4). This finding implies that market participants regard unfunded vested pension liabilities as similar to debt and other liabilities in assessing a firm's systematic risk.

In an effort to reduce the impact of multicollinearity reported in Table 3 and to use a more parsimonious model, the following modified version of model (4) was used to repeat the above analysis:

$$\beta_i=b_0^1+b_1^1\beta_{Ai}[1+(1-\tau_i)\frac{D_i}{E_i}]$$

$$+b_2^1\beta_{Ai}(1-\tau_i)\Delta\frac{D_i}{E_i}+\epsilon_i \qquad (4a)$$

Note that the model specified in equation (4) predicts b_1 to be equal to b_2. Thus, model (4a) is consistent with model (4) because it simply replaces b_1

and b_2 by b_1^1. However, the rearranged independent variables are not likely to be as highly correlated as in model (4).

The coefficient of correlation between the two independent variables,

$$\beta_{Ai}[1+(1-\tau_i)\frac{D_t}{E_t}] \text{ and } \beta_{Ai}(1-\tau_i)\Delta\frac{D_t}{E_t}),$$

of .438 was within the range of correlations reported in Table 3. Hence, this reformulation of model (4) did not appear to be helpful in dealing with the multicollinearity issue. However, the regression result using equation (4a) confirmed the result reported earlier in that b_2^1 was positive and statistically significant. Furthermore, b_2^1 was not significantly different from b_1^1.

In prior research, Daley [1984], Feldstein and Seligman [1981], and Oldfield [1976] found that unfunded vested pension liabilities affect the market determination of the employer's equity. Specifically, Daley [1984] found that unfunded vested pension liabilities, as defined in this study, reduce the market value of the employer's equity. Furthermore, his results suggest that this measure of unfunded vested liabilities understates the after-tax costs of future pension cash flows. Daley's [1984] results are similar to those of Oldfield [1976] and Feldstein and Seligman [1981] once their results are adjusted for the tax effect.

Results indicating that unfunded pension liabilities affect the employer firm's market risk are consistent with prior findings that these liabilities affect the market value of the employer's equity. However, these results do not indicate that the measure of unfunded vested pension liabilities used in this study understates or overstates the after-tax effects of future pension cash flows.

The results of this study should be viewed with caution. The model specified in equation (4) predicts coefficients b_1 and b_2 to be equal to one. However, our estimates of these coefficients are significantly lower than one. A plausible explanation for b_2 to be lower than its predicted value is related to relatively high interest rates during 1976–1979. High interest rates are likely to cause the market value of the debt to be lower than its book value. This would lead to an overstatement of the firm's debt-to-equity ratio as measured in this study, which in turn would result in underestimation of b_2. Similarly, underestimation of b_1 as well as b_2 may be related to measurement error associated with accounting beta [Maddala, 1977, p. 294]. Furthermore, the model is based on the assumptions of the capital asset pricing model and the assumption that firms can borrow and lend at the risk-free interest rate. Thus, another explanation for empirical coefficients to differ from those predicted theoretically may be related to the validity of these assumptions.

Although our estimates of coefficients b_1 and b_2 are comparable to those obtained by prior accounting research which used this basic model [Bowman, 1980; Mulford, 1985], the results suggest that the model is misspecified to a certain extent. The results of the study should be considered in light of this observation.

An argument was made earlier that collinearity between the reported debt-to-equity ratios, $\frac{D_t}{E_t}$, and the increase in this ratio due to inclusion of unfunded pension obligations, $\Delta\frac{D_t}{E_t}$, is not likely to present a serious problem in interpreting the coefficients of regression (4). To the extent this argument is not valid, results regarding the debt equivalence of unfunded pension obligations cannot be interpreted unambiguously.

A corporation is responsible for its unfunded pension liabilities only to the extent of 30 percent of its equity value and any further obligation is met by the PBGC. To control for possible effect of this law on the market's assessment of pension liabilities and market risk, regressions in Table 3 were repeated with one modification. If unfunded vested pension liability of a firm exceeded 30 percent of its equity, the liability was set equal to 30 percent of the market value of the equity. These results did not differ substantially from those shown in Table 3.

CONCLUDING REMARKS

This study examines whether capital market participants view unfunded vested pension obligations as debt liabilities in assessing the market risk of the firm. Specifically, a model linking operating risk, financial risk, and the effective tax rate to market risk of the firm was developed. A test was conducted to examine the effect of the inclusion of unfunded vested pension obligations in the measurement of financial leverage on the explanatory power of the model. The results of this test are consistent with the hypothesis that the market views these pension liabilities as a form of debt.

It is possible that unfunded pension obligations are considered a form of debt but are not strictly equivalent to debt, in which case their effect on market risk will differ from debt. That is, a dollar of systematic risk may affect the systematic risk of the firm differently than a dollar of conventional debt. A test was conducted to investigate this possibility. The results indicate that, after adjusting for the fact that contributions made by a firm to discharge its pension obligations are tax-deductible whereas the principal repayment of debt is non-tax-deductible, the market views unfunded vested pension obligations as equivalent to debt when assessing firm risk.

From a policy point of view, the evidence may provide justification for inclusion of unfunded pension liabilities in the balance sheet. One may argue that, as the results of this study suggest, the market is capable of using the footnote disclosure regarding unfunded vested liabilities in its assessment of market risk. Therefore, there is no reason to incorporate this information into the balance sheet. Then the issue becomes whether the objective is to incorporate all liabilities of a firm into its balance sheet or simply to disclose all liabilities and let each user make adjustments to the balance sheet based on supplementary disclosures.[7]

This study did not consider unfunded unvested pension obligations. This was motivated partly by the desire to narrow the scope of the study and partly because the data regarding these liabilities over the time period of the study were difficult to obtain. It would be interesting to examine how these liabilities interact with other liabilities and operating characteristics in the determination of market risk.

The model that links market risk to financial leverage in this study is incomplete. Subrahmanyam and Thomadakis [1980] show that the systematic risk of a firm is negatively related to the degree of monopoly power it possesses. However, they ignore financial leverage and the tax rate, so it is not clear how the monopoly power variable interacts with these variables in the determination of market risk of the firm. A replication of this study based on a model that incorporates the monopoly power factor into Hamada's model used in this study may provide some further insight into the effect of pension liabilities on market risk.

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[7] It is acknowledged that a capital market study of this nature alone cannot provide answers to the policy-related questions mentioned here. However, the results of such a study can be important inputs into the policy-making process.

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An Empirical Investigation of Pension Fund Property Rights

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ABSTRACT: This study empirically examines whether pension fund assets and liabilities associated with corporate-sponsored defined benefit pension plans are valued by the securities markets as corporate assets and liabilities. An equity valuation model based on the balance sheet identity is used to permit pension and non-pension assets and liabilities to have separate empirical coefficient values. This study differs from earlier ones [Feldstein and Seligman, 1981; Feldstein and Mørck, 1982; and Daley, 1982, 1984] which examine how share prices are affected by the *net* pension liability in the context of the Litzenberger and Rao [1971] equity valuation model. Using theoretical benchmark coefficient values for pension assets and liabilities based on the Miller [1977] model of capital market equilibrium, this study finds evidence consistent with the notion that pension fund property rights—ownership of pension assets and liabilities—lie fully with the firm. Several empirical extensions are explored to examine whether the basic finding can be made more robust.

PENSION funds receive much attention in both the academic literature and the popular financial press. The major interest concerns unfunded vested benefits (*UVB*)—that portion of a firm's vested pension obligation that exceeds the market value of the assets in the pension fund. A primary concern with *UVB* has been whether *UVB* is indeed a liability of the firm, and if it is, whether the market price of the firm reflects this off-balance-sheet item.[1] The concern is motivated by the fact that pension assets and benefits comprise a substantial share of the economic wealth of the economy, and by the potential for the mispricing of corporate securities (and the misallocation of capital resources) because pension disclosures are inadequate. For example, in 1981 the average ratios of pension assets to market value of common equity, and of total accrued benefits (vested plus non-vested) to market value of common equity for roughly the 1000 largest firms in the economy were 43 percent and 45 percent, respectively.

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[1] See *Business Week*, August 9, 1982, for a sample of the popular press's interest in *UVB*. Examples in the academic literature include Feldstein and Seligman [1981], Feldstein and Mørck [1982], and Daley [1982, 1984], among others.

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The same ratios stated in terms of book value of shareholder equity were 31 percent and 32 percent.

Empirical evidence in Feldstein and Seligman [1981] (hereafter FS), Feldstein and Mørck [1982] (hereafter FM), and Daley [1982, 1984] suggests that *UVB* is priced by the securities market as a corporate liability, but that its depressing effect on firm market value may be less than a dollar for each marginal dollar of *UVB*. One feature common to these studies is the incorporation of a "traditional" cross-sectional valuation model [Miller and Modigliani, 1966; Litzenberger and Rao, 1971; and Tobin and Brainard, 1977] into the research design to test for *UVB*'s effect upon equity market value. A second common feature is that the expected coefficient value of *UVB* is $-(1-\tau_c)$, where τ_c is the marginal corporate tax rate. In the FS and FM studies, the expected coefficient value for *UVB* is loosely based on the Miller and Modigliani [1958, 1966] equilibrium notion that the after-tax cost of debt to the firm is $(1-\tau_c)D$, where D is the market value of the firm's debt obligation. Daley's derivation of *UVB*'s coefficient, which is based on the Litzenberger and Rao model, is obtained by decomposing earnings into pension and nonpension components.

This study presents evidence which suggests that pension fund assets and pension fund liabilities are valued by the marketplace no differently than other corporate assets and liabilities. Recent proposals by the Financial Accounting Standards Board [FASB, 1982, 1985a], including the adoption of FAS 87 [FASB, 1985b], appear to indicate support in the accounting profession for the notion that unfunded pension liabilities are corporate liabilities that should appear on the corporate balance sheet. In fact, FAS 87 explicitly requires that firms (employers) recognize a liability if "the accumulated benefit obligation exceeds the fair value of plan assets" [FASB, 1985b, p. 10]. If taken at face value, evidence presented in this study suggests that there may be some merit to the FASB's proposals.

This study departs from the aforementioned pension studies in four significant ways, with respect to both the theoretical assumptions and the empirical research methodology. First, the focus will be on the separate effects that pension assets (*PA*) and pension liabilities (*PL*) have upon market value of equity (*MVE*), rather than on their net difference, *UVB*.[2]

Second, the cross-sectional market valuation model is based on the basic accounting identity which holds that shareholders' equity is the residual of corporate assets less corporate liabilities. Estimation of the accounting identity-based model adopted in lieu of the Litzenberger and Rao [1971] (hereafter LR) model (which is based on the single period capital asset pricing model [CAPM]) has several advantages. First, the accounting identity permits one to compare coefficient values of non-pension assets and liabilities to their pension counterparts, while the LR specification does not. Second, the LR model does not permit *UVB* to be priced unless one adopts Daley's earnings decomposition approach. Third, it is an alternative empirical specification to the LR-based model. Thus, the robustness of the prior pension study results can be studied in the context of an alternative empirical model.

Third, the current study adopts the Miller [1977] model of capital market equilibrium, in which the after-tax rates of return of stocks and bonds are equated. As a result, the benchmark coefficient values for *PA* and *PL* are 1 and −1, respectively. This contrasts with the Miller and Modigliani [1966]-based benchmark value of $-(1-\tau_c)$ for *UVB* adopted by FS, FM, and Daley.

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[2] It should be noted that earlier studies were, for the most part, limited to using *UVB* since separate pension asset and liability numbers were not readily available until FAS 36 disclosures were required.

Fourth, a variety of problems common to empirical cross-sectional valuation studies—measurement error in the regressors and violation of spherical symmetry of the error variance-covariance matrix—are explicitly dealt with to reduce bias in coefficient values and to increase efficiency of estimation. With respect to the latter issue, several generalized least squares (GLS) estimation techniques are employed to deal with specific models of the structure of the error variance-covariance matrix.

This paper has five sections. The first discusses the theoretical values of the coefficients from the basic valuation model that is estimated. The motivations for estimating the accounting identity-based model in lieu of the LR-based model are also presented in that section. The second discusses the list of potential departures from the OLS assumptions encountered in estimating the model and the econometric techniques that are used to potentially reduce the statistical problems created by such departures. Next, estimation results of the basic model are presented, adjusting only for heteroscedasticity in the residuals, followed by the estimation results for several extensions of the basic model that employ the econometric techniques discussed in the second section. Finally, the last section summarizes and concludes the paper.

THE MODEL AND EXPECTED COEFFICIENT VALUES

If we let *MVA* and *PA* represent the market value of the firm's non-pension assets and pension assets, respectively, and *MVL* and *PL* the market value of the firm's non-pension and pension debt, then the market value of the shareholders' equity (residual claim), *MVE*, is given by:

$$MVE=\alpha_1 MVA+\alpha_2 MVL+\alpha_3 PA+\alpha_4 PL \tag{1}$$

The model given by (1) is a more general version of the accounting identity which holds that net assets equals total assets less total liabilities, i.e., net assets represent a residual claim that corporate shareholders have to corporate assets after deducting the claims of debt holders. If the identity is stated in terms of market values, then net assets represent the market value of that residual claim. However, once the identity is stated in terms of market values rather than accounting book values, the tautology of the accounting identity is not necessarily preserved. For example, the market value of the residual claim may in fact exceed the market value of corporate assets less the market value of corporate liabilities, as the Miller and Modigliani [1966] model of capital market equilibrium suggests.

Equation (1), which is stated in terms of market values, allows for this possibility. In addition, it disaggregates corporate assets into pension and non-pension assets, and corporate liabilities into pension and non-pension liabilities. This procedure does two things. First, it allows for the possibility that pension assets represent assets to which the firm has claim, and that pension liabilities represent a debt obligation of the firm. Second, if in fact pension assets are corporate assets and pension liabilities are corporate obligations, it also permits the pension and non-pension components of corporate assets and liabilities to be differentially *priced* by the securities markets.

Landsman [1984] develops a steady-state growth model which suggests values for α_1, α_2, α_3, and α_4, in equation (1), assuming a model of capital market equilibrium based on Miller [1977]. In the Miller model, after-tax rates of return of stocks and bonds are equated (as a result of his assumption that bonds are taxed at the personal level, but stocks are untaxed at the personal level and subject to a symmetrical tax at the corporate level). Landsman adds the further assumption that defined benefit pension plans are the only tax-exempt institution, and he demonstrates that it is mutually advantageous for the firm and its workers to fully fund the pension plan exclusively with bonds up to the IRS-imposed constraint.[3]

The analysis conducted in Landsman [1984] suggests that in the Miller world, the coefficients of *MVA* and *MVL*, α_1 and α_2, will be 1 and -1, respectively. Two sets of benchmark values are established for the pension variable coefficients based on the notion of property rights. Two dimensions of property rights concerning the pension plan are (1) the sharing of the tax benefits created by the pension plan, and (2) the sharing of pension risk by the firm and its workers.[4] For the case in which the firm receives none of the tax benefits associated with the pension plan and bears none of the pension risk, the expected values of α_3 and α_4 are zero. For the case in which the firm receives all the tax benefits and bears all the risk, benchmark values of 1 and -1, respectively, are established for α_3 and α_4.

Pension Coefficients when PA and PL are Property of the Firm

To derive the benchmark values of 1 and -1 for the case in which *PA* and *PL* are effectively property of the firm, Landsman develops the following model. Consider a firm that is growing in steady-state at the rate of g in a Miller economy in which—to keep things simple—there are only two types of securities: bonds, which are riskless, and stocks, which are risky.[5] Letting r represent the rate earned on bonds, the firm's after-tax cost of borrowing becomes $r(1-\tau_c)$, where τ_c is the marginal corporate tax rate. Now, assuming this firm is the sponsor of a defined benefit pension plan, it has a pension obligation with a particular present value, PL_t, at the end of period t, and an associated pension fund with a market value of PA_t, invested entirely in bonds. Finally, let γ represent the constant fractional payout of the firm's pension obligation each period, where γ is greater if the firm's labor force is older, and $0 \leq \gamma \leq 1$.

Consider the pension fund. Attendant with the assumption of a steady-state growth rate, g, PA_{t+1} is simply $(1+g)PA_t$. The growth of the pension fund from time t to time $t+1$ comes about in three ways. First, interest is earned on the fund which, *ceteris paribus*, would bring the fund to a level of $(1+r)PA_t$ at time $t+1$. However, a portion of the current benefits, γPL_t, is paid out to retired workers at time $t+1$. In addition, the firm makes a contribution of the amount c_{t+1} to the pension fund at time $t+1$. The amount contributed by the firm raises the funding level to the maximum amount allowed by the IRS. Putting all of this together, we have

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[3] This result is consistent with Black [1980], Tepper [1981], and Harrison and Sharpe [1982].

[4] The workers are said to fully bear the pension risk if they reap all the costs and benefits of changes in the market value of the pension assets. The firm is said to fully bear the pension risk if the workers are promised pension benefits that deliver future payments at retirement (in lump-sum or in annuity form) that enable workers to purchase a certain real basket of goods regardless of pension fund performance.

[5] Assuming bonds to be risky does not alter the analysis. In Miller's model, risk-adjusted after-tax rates of return on bonds and stocks would be equated. Bonds would still be held exclusively in the pension portfolio.

$$(1+g)PA=(1+r)PA+c-\gamma PL. \quad (2)$$

Note that the subscripts in (2) have been suppressed, with implicit t subscripts for PA and PL, and an implicit $t+1$ subscript for c. The interpretation of (2) is that a firm growing at steady-state rate g must contribute an amount, c, to return to a steady-state level of pension funding by the end of each period. Solving explicitly for c and multiplying through by $(1-\tau_c)$, the after-tax cost of making the contribution is:

$$c(1-\tau_c)=(1-\tau_c)(\gamma PL-(r-g)PA). \quad (3)$$

The total present value of the cost to the firm of covering its pension obligation, P, is therefore given by

$$P=\frac{(1-\tau_c)(\gamma PL-(r-g)PA)}{r(1-\tau_c)-g}, \quad (4)$$

where the expression on the right-hand side of (4) represents the present value of a perpetuity of $c(1-\tau_c)$, growing at a rate g, discounted at the after-tax marginal corporate rate of return, $r(1-\tau_c)$.[6] If we let V represent the present value of the firm's future net after-tax cash inflows other than the contributions to the pension plan, then the market value of the firm, MVE, is given by $V-P$:[7]

$$MVE=V-\frac{(1-\tau_c)(\gamma PL-(r-g)PA)}{r(1-\tau_c)-g}. \quad (5)$$

Comparative Statics

We are now ready to evaluate the marginal impact upon MVE of marginal changes in PA and PL by differentiating (5) with respect to PA and PL, respectively. Partial differentiation with respect to PA yields:

$$\begin{aligned}\frac{\partial MVE}{\partial PA}&=\frac{(r-g)(1-\tau_c)}{r(1-\tau_c)-g}\\&=(1-\tau_c)+\frac{(1-\tau_c)r\tau_c}{r(1-\tau_c)-g}\end{aligned} \quad (6)$$

which is greater than 1 for $g>0$ and $\tau_c>0$. The economic interpretation of the partial derivative is the following. The first term on the second line of (6), $1-\tau_c$, represents the increase in firm value created by placing an additional dollar into the fund *after tax*, other things being equal. The second term, $\frac{(1-\tau_c)r\tau_c}{r(1-\tau_c)-g}$, represents the present value of the tax savings associated with being able to earn the before-tax rate of return on the marginal dollar in the pension fund—i.e., it is the present value of the tax shield created by the extra dollar. Thus, for a firm growing at the rate $g>0$, each additional dollar placed in the pension fund increases the value of the firm by an amount exceeding a dollar. If the partial derivative in (6) is evaluated at $g=0$, then the resulting expression is equal to 1, i.e., $\left.\frac{\partial MVE}{\partial PA}\right|_{g=0}=1$. In this case, the firm's marginal contributions to the plan will not grow in subsequent periods. Note that $\frac{\partial MVE}{\partial PA}$ is also equal to 1 for the case in which $\tau_c=0$.

To evaluate how a marginal increase in the firm's pension obligation, PL, affects firm value, we now differentiate (5) with respect to PL:

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[6] It is assumed that $r(1-\tau_c)>g$ to prevent the firm from having infinite value.

[7] Both the non-pension and pension cash flows which are represented by V and P, respectively, are discounted at the rate $r(1-\tau_c)$. This implies that the marginal investor values the firm using the same rate, since τ_p for the marginal investor is assumed to be equal to τ_c. This follows from the Miller model assumption that stocks are not taxed at the personal level.

$$\frac{\partial MVE}{\partial PL} = -\frac{(1-\tau_c)\gamma}{r(1-\tau_c)-g} \leq 0. \quad (7)$$

Equation (7) says that each additional dollar increase in the firm's pension obligation, other things being equal, results in a reduction in firm value if γ, the fractional payout rate of the pension obligation, is strictly positive, and τ_c is strictly less than one. Evaluating the partial derivative in (7) at $\gamma=r$ and $g=0$ reduces the expression to -1. The economic intrepretation of the evaluation of the derivative at $g=0$ is that the pension obligation, PL, is increased by \$1 today and forever into the future, i.e., the dollar increase will not grow at rate g, but will remain at a dollar.

Evaluation of the derivative at $\gamma=r$ can be interpreted as the condition whereby the firm's payout rate matches the interest accrual on the pension debt—the firm exactly pays off only the interest portion of the debt each period.

An obvious question is raised by the result that $\left.\frac{\partial MVE}{\partial PL}\right|_{g=0,\gamma=r} = -1$ when this result is compared to the results of earlier studies, notably FS, FM, and Daley. In these studies, the authors expect the marginal effect of the *net* pension liability, $NPL \equiv PL - PA$, on MVE to be $-(1-\tau_c)$, not -1. Why does the relevant comparative static result from this study differ from the expectations of these earlier studies? There are, unfortunately, several differences between this study and the earlier ones that make direct comparison difficult. First, these earlier studies either fail to make clear which model of capital market equilibrium is assumed—as is the case with FS and FM—or a different model of equilibrium is assumed—the CAPM in the case of the Daley studies. In the current study, the Miller model is explicitly assumed. Second, the prior studies focus on the *net* pension liability, NPL. In contrast, the partial effects of PA and PL are considered separately here.[8] Third, no formal model is explicitly developed in FS and FM, and a *flow* or *earnings*-based model is developed in Daley, in contrast to the *stock* or *balance sheet*-based model used in this study.[9]

Although α_3 and α_4 are not demonstrated by Landsman to be cross-sectional constants—a result that has implications concerning the empirical estimation procedure which assumes they are—the important thing to note is that the benchmark value for α_4 (the pension debt coefficient) in particular is not $-(1-\tau_c)$, as is the case in FS [1981], FM [1982], and Daley [1982, 1984]. Thus, if the marginal corporate tax rate is roughly 50 percent, then the FS, FM, and Daley studies would suggest a value of approximately -0.5 for α_4, whereas the Landsman study would suggest a benchmark value of -1.[10]

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[8] Note that by modeling the effect of NPL upon MVE instead of PA and PL separately, FS, FM, and Daley do not allow for the possibility that PA and PL may marginally affect MVE differently. An empirical implication of this is that by including NPL as a regressor in a regression equation with MVE as the dependent variable, PL and PA are implicitly forced to have coefficients that are equal but opposite in sign.

[9] If one is willing to assume that the modeling discrepancies are inconsequential, the difference in expected marginal effect of the pension liabilty upon market value of shareholder equity may be explained by a difference in assumed funding levels. FS and FM assume that the pension plan is funded at a level below the fully funded amount. The value of $-(1-\tau_c)$ represents the marginal cost to the firm of reaching the fully-funded position, as, for example, FS note [1981, p. 806]. (Daley is silent on the funding level assumption.) In contrast, in the model developed here, the firm is assumed to always be at the optimal funding level which, as the Miller assumptions imply, is the fully funded position. The value of -1 for $\frac{\partial MVE}{\partial PL}$ makes an implicit comparison of the market value of a fully funded firm to one which is fully funded, but whose funding limit is greater. Stated yet another way, the distinction between the Miller-based result of -1 and the competing hypothesis of $-(1-\tau_c)$ for $\frac{\partial MVE}{\partial PL}$ is that the former result is derived by performing comparative statics on a firm at the *equilibrium* fully funded level, whereas the latter is derived by performing comparative statics on a firm at the out-of-equilibrium under-funded position.

One final point concerning the models estimated by FS, FM, and Daley should be noted. The basic model they each estimate is based on the LR equity valuation model. The LR model, developed from the single-period CAPM [Sharpe, 1964 and Lintner, 1965], provides that the market value of shareholder equity of the i^{th} firm, MVE_i, is linearly related to expected earnings, E_i, and the standard deviation of expected earnings, $\sigma(E_i)$:[11]

$$MVE_i = \theta_0 + \theta_1 E_i + \theta_2 \sigma(E_i). \tag{8}$$

Since E and $\sigma(E)$ are not observable, researchers are forced to use surrogate measures. For example, reported earnings is used as a surrogate measure of economic earnings, and β [FS, FM] and the standard deviation in reported earnings [Daley] are used as surrogates for $\sigma(E_i)$.

FS, FM, and Daley all add *UVB* $(PL-PA)$ to the LR equity valuation model. In the case of FS and FM, no firm theoretical justification is provided for the addition of *UVB* to the LR valuation equation. Daley's model does permit *UVB* to appear in the LR-based equation by "splitting" the earnings term into pension and non-pension cash-flow components using a procedure similar to Bowen [1981]. Ignoring the Daley procedure for a moment, note that if one accepts the CAPM as the model that describes capital market equilibrium prices, and if one accepts the notion that reported earnings and β do not systematically mismeasure E and $\sigma(E)$, then there is no room for *UVB* to be priced even if it were actually regarded as a liability by the marketplace. This is because *UVB* would be implicitly priced through either E or $\sigma(E)$ or through both terms.[12] For *UVB* to have a non-zero empirical coefficient, at least one of the following is true:

1. The CAPM is the correct model of security returns—only two factors are priced—but the market fails to include *UVB* in forming its expectations of the future risk and earnings potential of the firm. This, in essence, means that securities markets are inefficient, which is in contradiction of the CAPM's assumption of perfect markets.
2. The CAPM is the correct model of security returns, but either E or $\sigma(E)$—or both—are measured with systematic error, and *UVB* is correlated with this error or "omitted variable."
3. The CAPM is not the correct model of security returns, and perhaps a two-or-more factor version of the arbitrage pricing theory (APT) of Ross [1976] and Roll and Ross [1980], which allows for k factors to be priced, is the correct model.

Given the contradictory logic on which the first reason is based, it appears that only the latter two reasons in the list have possible validity. However, because the APT provides formidable testing problems and offers no theoretical values for any coefficients beyond the two-factor version, the APT-based pension researcher must contend with the relatively *ad hoc* nature of the process of interpreting results. If one adopts the measurement error perspective, then it makes sense to use instruments for each of the explanatory variables that the researcher believes is seriously mismeasured. This approach is, in fact, adopted by Daley [1982, 1984].

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[10] Daley incorporates the tax effect into the unfunded pension debt measure. The expected coefficient, given this redefinition, is -1 under the Daley model.

[11] LR add an *ad hoc* term to the pure CAPM-based valuation model to capture the expected growth in earnings in excess of the cost of capital. The pure valuation model based on the CAPM does not allow for growth in excess of the cost of capital.

[12] The same is true for all other assets and liabilities of the firm as well.

Regardless of the underlying theoretical relationship between *UVB* and shareholders' equity, it is difficult to find an economically meaningful interpretation of *UVB*'s coefficient obtained from a CAPM-based equity valuation model unless one adopts the earnings component procedure of Daley.[13] However, regardless of where one stands concerning the legitimacy of the Daley procedure, estimation of equation (1) based on the accounting identity permits *UVB* to be priced. Furthermore, the accounting identity-based model permits the components of *UVB−PA* and *PL*—to have different coefficients.

In the next section, the empirical procedures that are employed to estimate equation (1) are discussed. Emphasis is placed on discussing the econometric problems encountered in estimating (1) and ways to potentially reduce the severity of the problems. A description of the data is also provided in the next section.

EMPIRICAL PROCEDURES AND DESCRIPTION OF THE DATA

The empirical analogue of the theoretical model given by equation (1) is:

$$MVE_i = \alpha_0 + \alpha_1 MVA_i + \alpha_2 MVL_i + \alpha_3 PA_i + \alpha_4 PL_i + \epsilon_i. \qquad (9)$$

The difference between (1) and (9) is that two terms have been added to the former equation to construct the latter. If the theoretical model is correct, then the empirical value of α_0 should be zero. The error term, ϵ_i, is simply the disturbance term from a regression model.[14] The data used to estimate (9) are discussed next, in part to serve as an introduction to the source of many of the econometric problems encountered in estimating (9).

Description of the Data

The data used to estimate (9) are drawn from three separate data bases. Data are available beginning in 1979, extending through 1981, which allows the cross-sectional relation to be estimated for three annual time periods. All December 31 fiscal year-end firms on the FAS 36 Data Bank Tape for which data were available were included in the sample.[15] The FAS 36 Data Bank was constructed using the FAS 36 disclosures of the FAS 33 population. Because of the "size" test disclosure criteria under

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[13] Daley's procedure of "splitting" the earnings term in the LR model into pension and non-pension cash flow components is similar to the procedure first adopted by Bowen [1981]. In the Bowen study, earnings is split into allowance for funds used during construction (AFC) credits and operating earnings of electric utilities. There are two potential problems with the splitting procedure: (1) the LR model is silent on the issue of whether earnings can be meaningfully split into components; and (2) the components are not likely to be directly observable, creating an additional source of measurement error in the empirical version of the model.

[14] The source of the error term could be either (1) measurement error in *MVE*, (2) measurement error in any of the independent variables, or (3) omitted independent variables. Although measurement error of *MVE* is probably close to zero, measurement error in the independent variables probably is not. In fact, the same problem that gives rise to such measurement error—the use of book values as proxies for *MVA* and *MVL*—is also the likely source of omitted independent variables. The source of measurement error in the independent variables and the potential empirical problems this creates are discussed in the next subsection.

[15] Only fiscal year-end December 31 firms are included in the study, implicitly avoiding the need to pool observations across time as well.

FAS 33, the FAS 36 Data Bank Tape population is made up of only very large firms.

Market value of shareholders' equity (*MVE*) is defined to be price times number of shares outstanding as of December 31 for each year. Price and share data are drawn from the COMPUSTAT Industrial and OTC tapes. Book value of total non-pension assets (*ASBV*) and book value of total non-pension debt (*LIBV*) are also taken from the COMPUSTAT tapes. Each of these historical cost accounting variables is used as a surrogate for its respective market value quantity—*MVA* or *MVL*—because the latter two are unobservable.

For the pension variables, *PA* and *PL*, data are taken from the FAS 36 Data Bank Tape. Pension assets (*PA*) are recorded at market value for those assets within the pension fund that are held in marketable securities. Non-marketable securities, such as mortgages, for which market values are not readily available, are valued by the reporting firm. Pension liabilities (*PL*) are represented by the actuarially-determined present value of the accrued benefit pension obligation as reported by each firm.

The interest rate used by the actuary to estimate *PL* is reported in the FAS 36 disclosure and is thus on the Data Bank tape. This enabled the reported *PL* number to be adjusted to reflect an interest rate different from the one used by the actuary. Two sets of regressions are estimated for the basic model for each year: one that uses the reported or *unadjusted* pension liability (*PLU*), and one that is adjusted to reflect a 25-year, ten percent annuity assumption (*PL*10). The motivation for adjusting *PLU* to reflect a common interest rate is related to the desire to improve estimation by reducing potential measurement error. The hypothesis underlying the common interest rate adjustment is that the appropriate rate with which to discount future pension payments to workers is the prevailing risk-free rate of interest.[16] Adjustment of *PL* to reflect a 25-year, ten percent annuity assumption should reduce mismeasurement of *PL*, if the only source of error is the chosen discount rate.[17] Of course, other sources of measurement error associated with the reported pension liability figure may arise from both the accounting treatment of the pension obligation and the set of actuarial assumptions used to compute it. In particular, advocates of *projected benefits* methods might argue that accrued pension benefits figures seriously understate the "true" pension liability values (see Landsman [1984, pp. 32–33]).

In addition to the five variables appearing in equation (9), each firm's sales figure (*SALES*) and current cost of assets (*ASCC*) were taken from the FAS 33 Inflation Data Bank tape.[18] As will be discussed in the next section, *SALES* is used as a deflator to help deal with the problem of heteroscedastic error terms, whereas *ASCC* is used to test a specific measurement error model.

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[16] Landsman [1984] suggests that the appropriate discount rate for measuring the pension liability is the risk-free rate. This is because in the Miller [1977] model of capital market equilibrium which is assumed, optimal pension fund management requires pension assets to be invested solely in bonds (which are assumed in the Landsman study to be riskless) in order that the pension fund take advantage of its tax-deferred status.

[17] With respect to the interest rate adjustment on *PLU*, three things should be noted. First, note that the use of an annuity adjustment on *PLU* will likely affect the coefficient value of the resulting pension liability variable. However, the use of different interest rates would affect only the coefficient of the interest rate-adjusted variable and not the t-statistic, because the annuity adjustment is a linear transformation of *PLU*. Thus, ten percent, the prevailing riskless rate in the first sample year (1979), was selected arbitrarily. Second, the choice of a 25-year term for the pension "annuity" is representative of what several reporting firms feel is appropriate for measuring the pension liability. Third, adjusting *PLU* to reflect a different interest rate than the one chosen by the actuary may introduce measurement error if, for example, an arbitrarily low interest rate assumption is offset by some other actuarial assumption.

[18] *ASCC* is constructed by replacing the historical cost measures of inventory and net plant with the current cost counterparts provided from the FAS 33 tape.

It is important to highlight the potential relative improvement in quality of the FAS 36 pension data set over the pension data used in previous studies. The improvement in quality arises from four features of the FAS 36 disclosures:

1. The FAS 36 pension data are drawn from mandated disclosures.
2. The reported pension liability is created under a more uniform method.
3. The interest rate implicit in the reported liability figure (*PLU*) is reported.
4. The sample of firms is relatively large.

An implication of the first point is that a potential for sample selection bias present in earlier studies has been reduced. FS, for example, were limited to using pension data disclosed voluntarily by a relatively small number of firms in their annual reports prior to the mandate period. An implication of the second point is that the pension liability variable used in this study will be potentially less noisy than the pension liability figure used in earlier studies, although this, of course, is an empirical issue. As discussed above, an implication of the third point is that the reported pension liability figure can be adjusted to reflect a common interest rate and thus potentially reduce measurement error in that variable. An implication of the final point is that the enlargement of the size of the observation set from, for example, under 200 in FS to over 600 in this study, is that there may be some increase in efficiency and confidence in the empirical results. As an example, to the extent that the FS variable of interest, *UVB*, is collinear with the other independent variables and the error structure from their regressions does not conform with the OLS assumption of cross-section independence, a tripling of the number of observations could produce an increase in the precision and efficiency of the estimated coefficients.

Empirical Procedures

In the discussion of the data, several potential econometric problems associated with estimation of equation (9) were mentioned. The four problems that are discussed in turn are: (1) heteroscedasticity, (2) measurement error in the regressors, (3) multicollinearity, and (4) cross-sectional and cross-equation (time) dependence of the error term. The techniques used to deal with these issues in the empirical research design are also discussed.

Heteroscedasticity

One potential econometric problem when estimating cross-sectional valuation models is the problem of heteroscedastic disturbances which arises from the fact that large (small) firms tend to produce large (small) disturbances. It is often possible to use generalized least squares (GLS) techniques (see, e.g., Johnston [1972, Chapter 7] or Kmenta [1971, Chapter 12]) to produce more efficient estimates than those obtained using ordinary least squares (OLS). For example, if one knows *a priori* what the relation is, say, between the error variance and the "size" of the firm, then one can, in principle, transform the variables in a particular regression model to produce a constant (but still unknown) variance.

In the case of the two-variable linear model, one common deflation technique involves transforming the variables by deflating by the independent variable. This procedure implies that the true error variance is proportional to the square of the independent variable. Park [1966] generalizes this model by suggesting that one should estimate the power of the independent variable (instead of assuming it to be two) involved in the proportion by regressing the natural log of the residual variance, $ln(\hat{\epsilon}^2)$, on the natural log of the independent variable.

The procedure adopted in this study, based on Park [1966], estimates the following relation between the residual variance and *SALES*:

$$ln(\hat{\epsilon}_i^2) = \Gamma_0 + \Gamma_1 SALES_i + \Gamma_2 (lnSALES_i)^2 + \nu_i \qquad (10)$$

where the $\hat{\epsilon}_i$'s are the residuals obtained from estimation of equation (9) in undeflated form. The estimated values of the Γ's, (the $\hat{\Gamma}$'s) are then used to transform (9)'s variables by deflating each variable by the following expression:

$$SALES^{(\hat{\Gamma}_1 + \hat{\Gamma}_2 lnSALES)/2}. \qquad (11)$$

This multivariate adaptation of the Park procedure uses *SALES* instead of one of the independent variables in (9) as the measure of firm size.[19] Furthermore, it allows for the possibility that the relation between $ln\epsilon^2$ and $ln\ SALES$ is non-linear, i.e., quadratic.

The use of deflation to reduce heteroscedasticity and thereby increase efficiency is not, unfortunately, a costless procedure. One notable potential cost is the difficulty in making inferences in the presence of spurious correlation. Kuh and Meyer [1955, cited in Maddala, 1977] show that the correlation between an endogenous variable, Y, and a set of explanatory variables, $X_1, X_2, \ldots, X_k$, may either increase or decrease the correlation between Y and the X's in deflated form. Such spurious correlation may lead to a bias in the regression coefficients.

Measurement Error in the Regressors

Because market values for each of the explanatory variables in equation (9) are not directly observable, estimation of (9) may result in biased coefficients resulting from measurement error in those variables. However, without knowledge of (a) the specific form of measurement error—i.e., whether it is systematic or random noise—and (b) the covariance structure of the measurement error of the four explanatory variables, it is difficult to predict what bias—if any—to expect in the estimates of the regression coefficients.

Three specific models of measurement error of the regressors are considered. The first measurement error model examines whether adjustment of *PLU*, the pension liability as reported, to reflect a uniform 25-year annuity assumption at a ten percent rate of interest can also improve estimation results. The second examines whether historical cost assets (*ASBV*) and liabilities (*LIBV*) systematically understate *MVA* and *MVL* because the former pair of variables does not include off-balance-sheet items—in particular, *PA* and *PL*. The third model of measurement error examines whether an alternative measure for *MVA* can produce better estimation results than when *ASBV* is used. Tests of these three measurement error models are discussed in the next major section.

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[19] Although an obvious extension of the Park procedure for the multivariate linear model would in fact involve estimation of equation (10) using one of the four independent variables from (9), *SALES* was chosen because it is probably less dependent on capital structure or size of a firm's pension plan, and is, by implication, a better measure of firm size. A popular choice for deflator in the literature, book value of shareholders' equity (*BVE*) (see, e.g., FS [1981] and Daley [1982, 1984]) was ruled out because of the instability of coefficients that would result from the near singularity of the $X'X$ matrix caused by the identity between *BVE* and *ASBV*, *LIBV*, and the intercept in (9).

Multicollinearity

While OLS estimates of regression coefficients are unbiased in the presence of multicollinearity, several problems are potentially introduced including (a) imprecision of estimation (high sampling variances), and (b) a high degree of sensitivity of the estimates of the coefficients to particular sets of sample data. The presence of a severe multicollinearity problem could result in drawing misleading inferences from sample t-statistics. In particular, even though the sample t-statistics are unbiased (if there are no other econometric problems), it is difficult to determine whether the sampling variances are large because of multicollinearity, or whether the variance of the true population is large.

One possible way to increase the precision of the estimates of the coefficients in equation (9) is to estimate the model in net asset form, i.e., to use net non-pension assets $(MVA-MVL)$ and net pension assets $(PA-PL)$ as explanatory variables in the following model:

$$MVE_i=\alpha_0+\alpha_1(MVA-MVL)_i + \alpha_2(PA-PL)_i+\epsilon_i. \qquad (12)$$

However, estimation of (12) in lieu of (9) is justifiable only if (a) the theoretical coefficient values for MVA and MVL, and for PA and PL, are the same (in absolute value), and (b) the estimated coefficients provide statistical evidence that supports the theoretical economic model,[20] i.e., $\hat{\alpha}_1=-\hat{\alpha}_2$, and $\hat{\alpha}_3=-\hat{\alpha}_4$. Recall from the discussion in the first section that the model developed in Landsman [1984] suggests that the theoretical values of the coefficients are reasonably close to satisfying the first necessary condition for netting. Whether the second necessary condition is satisfied is discussed later.

Cross-Equation Dependencies and Cross-Sectional Correlation of Residuals

If the off-diagonal elements of the variance-covariance matrix from a regression model are non-zero, then the OLS estimator will not be the best linear unbiased estimator (BLUE). Efficiency can be increased by using a specific (GLS) estimator if the researcher knows the correct model of error covariance. The use of the GLS estimator need not be limited to estimation of a single cross-sectional model or time series model. For example, GLS can be employed to estimate a system of equations or a model that includes a panel of data if the error terms are correlated across time or between the cross-sectional units. Kmenta [1971, chapter 12] offers several models of residual covariance that econometric modelers can employ. Two models of residual covariance that appear appropriate to consider are the Zellner [1962] Seemingly Unrelated Regressions model (SUR) and the Error Components model (EC). The SUR and EC models are used in an attempt to create more efficient estimates of the regression coefficients. As will become clear when the regression results are presented in the next section, this is an important consideration, especially with respect to the pension variable coefficients. Relatively high standard errors for the pension variable coefficients can make it impossible to distinguish empirically between the benchmark values of 1 and -1 and 0.

SUR estimation for cross-sectional models with two or more years of data permits disturbances for different equations to be mutually correlated, i.e., $\sigma_{s,t}$

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[20] A more careful statement of the second necessary condition for netting the variables is: $P_r(\alpha_1+\alpha_2=0, \alpha_3+\alpha_4=0)\geq 1-w$, where w represents the confidence level imposed by the researcher. A test which is equivalent to the probability statement is a simple F-test.

for years s and t ($s \neq t$) is permitted to be non-zero. $\sigma_{s,t}$ is assumed to be constant over all observations, i.e., for $j=1, \ldots, n$ (where n is the number of firms in the cross-section), $\sigma_{s,t;i}=\sigma_{s,t;j} \forall i,j$. Thus the disturbance term in any equation (year) is homoscedastic and cross-sectionally uncorrelated, but the variance can be different in each equation (year). SUR estimation has been used in the literature (e.g., Schipper and Thompson [1983]) to model cross-sectional dependencies in the error structure. Note that in contrast, the cross-equation dependency that is specifically modeled in this study is *time* dependency. The Error Components model (EC) is a specific model of the error structure of a regression model of panel data. Like SUR, the EC model permits the disturbances from different cross-sections (years) to be correlated. Unlike SUR, EC permits cross-sectional correlation of residuals in a given panel of data. However, EC estimation, by assumption, does two things that SUR does not, and is thus, along these dimensions, more restrictive:

1. While mutual correlation of residuals across years is, like SUR, permitted to be non-zero, the assumptions of the model impose the restriction that the correlations are the same between any two years, i.e., $\sigma_t=\sigma_{t,t+v} \forall v$. That is, there is no dampening of the mutual correlation of residuals through time.
2. The vector of coefficients is forced to be the same for each cross-sectional equation, i.e., EC pools the data from different years and cross-sections.

By assumption, the error term, ϵ_{it}, has three components—one associated with time, another with the cross-sectional units, and the third varying in both dimensions, i.e., $\epsilon_{it}=u_i+v_t+w_{i,t}$ for $i=1, \ldots, n$ and $t=1, \ldots, T$, where the u's, the v's, and the w's are each normally distributed with mean zero and constant and individual variances. The EC model has the compelling interpretation that the variance of, say, General Motors can be bigger than that of American Motors, and the variance of both firms can be bigger in 1981 than in 1979. Furthermore, the disturbance associated with GM in 1979 can be correlated with American Motors' in 1979. One potential cost of imposing the EC model—even when it is the correct model of the error structure—is that the variance components estimates are likely to be imprecise if the number of cross-sectional units (n) or years (T) is *small*. This is because the estimates of the variance components are obtained using a recursive procedure that involves averaging residual errors over both time and cross-sectional units. With $T=3$ in this study, the EC components may be subject to this high sampling error problem.

EMPIRICAL RESULTS: THE BASIC MODEL

The previous section discussed the four major empirical problems that are likely to be encountered when estimating the basic model given by equation (9) above. In this section, the estimation results of the basic model in which only deflation is employed in addition to OLS are presented and discussed. However, the regressions associated with the several measurement error models from the empirical procedures section are also discussed. Both (1) the net asset regression results (and the accompanying tests for the empirical validity of netting) that are employed to address the multicollinearity problem, and (2) the SUR and EC regressions, which are estimated to increase efficiency in estimation, are presented and discussed in the next section.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF BASIC MODEL REGRESSION VARIABLES

	1979	*1980*	*1981*
PLU Specification			
N	235	621	624
MVE :mean	48.98	105.98	99.23
:std. dev.	46.51	98.56	89.84
ASBV:mean	117.11	222.97	236.21
:std. dev.	92.23	198.87	182.31
LIBV :mean	67.86	130.01	136.41
:std. dev.	59.76	152.79	120.26
PA :mean	9.64	19.49	28.90
:std. dev.	12.55	20.40	28.90
PLU :mean	11.21	21.05	23.19
:std. dev.	14.45	23.05	29.00
PL10 Specification			
N	235	621	624
MVE :mean	116.16	172.64	105.05
:std. dev.	118.27	165.05	97.25
ASBV:mean	276.26	360.24	250.92
:std. dev.	228.47	292.20	198.08
LIBV :mean	159.96	209.02	144.94
:std. dev.	146.19	208.34	129.83
PA :mean	23.04	32.62	25.28
:std. dev.	32.08	38.17	32.33
PL10 :mean	20.45	28.14	20.69
:std. dev.	29.14	35.36	28.64

Heteroscedasticity and the Basic Model

Using the multivariate adaptation of the Park [1966] procedure, estimation of the deflation parameters to reduce the problem of heteroscedastic disturbances—and thereby increase efficiency—involves two steps. The first is to estimate the model in undeflated form. The second step regresses the residuals from the undeflated model on *ln SALES* and $(ln\ SALES)^2$ to estimate the transform of *SALES* that will be used as the deflator. Because two definitions of the pension liability (*PL*,) are offered, equation (9) was actually estimated—in both deflated and undeflated forms—using two regression models. The first set of regressions uses the reported pension liability, *PLU*, and will be referred to as the "*PLU* regressions." The second set uses a measure of the pension liability adjusted to reflect a 25-year annuity assumption at ten percent, *PL*10, and will be referred to as the "*PL*10 regressions." The models that are estimated in both deflated and undeflated form for the years 1979–1981 are given by the following two equations:

$$MVE_t=\alpha_0+\alpha_1 ASBV_t+\alpha_2 LIBV_t+\alpha_3 PA_t+\alpha_4 PLU_t+\epsilon_t \quad (13a)$$

$$MVE_t=\beta_0+\beta_1 ASBV_t+\beta_2 LIBV_t+\beta_3 PA_t+\beta_4 PL10_t+\epsilon_t \quad (13b)$$

TABLE 2

CORRELATION COEFFICIENTS OF VARIABLES FROM BASIC MODEL REGRESSIONS[a]

1979: N=235

	MVE	*ASBV*	*LIBV*	*PA*	*PL*
MVE	1.00	0.50	0.38	0.36	0.29
ASBV	0.54	1.00	0.96	0.46	0.40
LIBV	0.42	0.97	1.00	0.36	0.31
PA	0.41	0.50	0.40	1.00	0.94
PL	0.30	0.42	0.33	0.94	1.00

1980: N=621

	MVE	*ASBV*	*LIBV*	*PA*	*PL*
MVE	1.00	0.27	0.17	0.09	0.03
ASBV	0.32	1.00	0.96	0.32	0.26
LIBV	0.20	0.96	1.00	0.26	0.22
PA	0.16	0.37	0.30	1.00	0.90
PL	0.07	0.30	0.24	0.90	1.00

1981: N=624

	MVE	*ASBV*	*LIBV*	*PA*	*PL*
MVE	1.00	0.47	0.32	0.27	0.18
ASBV	0.49	1.00	0.96	0.44	0.40
LIBV	0.35	0.96	1.00	0.37	0.31
PA	0.30	0.47	0.39	1.00	0.94
PL	0.18	0.38	0.33	0.93	1.00

[a] Correlations above (below) the diagonal in each table refer to the PLU (PL10) model specification.

where

MVE_i = market capitalization of shareholder equity, firm i,
$ASBV_i$ = historical cost book value total assets, firm i,
$LIBV_i$ = historical cost book value total debt, firm i,
PA_i = market value of pension assets, firm i,
PLU_i = reported vested plus non-vested benefits pension liability, firm i, and
$PL10_i = PLU_i$ adjusted to reflect a 25-year annuity valuation at ten percent.

Because the undeflated regressions are estimated for the purpose of estimating the deflator to make the disturbances more homoscedastic, the summary statistics from these regressions are not presented or discussed.[21] The means and standard deviations of the variables in (13a) and (13b) are listed in Table 1. Table 2 presents the correlation coefficients of these same variables. Table 3 lists

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[21] The expected coefficient values from the scaled and unscaled regressions are the same if spurious correlation is not induced by scaling. However, the sample correlation coefficients need not be identical whether or not spurious correlation exists. The point estimates of the

TABLE 3
BASIC MODEL REGRESSION SUMMARY STATISTICS

MODEL: $MVE_t = \alpha_0 + \alpha_1 ASBV_t + \alpha_2 LIBV_t + \alpha_3 PA_t + \alpha_4 PL_t + \epsilon_t$

	α_0	α_1	α_2	α_3	α_4	R^2	DFE*
1979 *PLU* Model						0.44	230
Estimate	12.66	1.08	-1.31	0.95	-0.89		
t-ratio	3.24	9.27	-7.70	1.61	-1.85		
Prob > |*t*|	0.0014	0.0001	0.0001	0.1068	0.0644		
1979 *PL10* Model						0.47	230
Estimate	27.57	1.07	-1.30	1.60	-1.82		
t-ratio	3.22	9.11	-7.59	2.63	-2.94		
Prob > |*t*|	0.0015	0.0001	0.0001	0.0089	0.0035		
1980 *PLU* Model						0.25	616
Estimate	41.61	0.96	-1.09	0.44	-0.83		
t-ratio	6.57	13.12	-11.65	1.03	-2.38		
Prob > |*t*|	0.0001	0.0001	0.0001	0.2784	0.0174		
1980 *PL10* Model						0.31	616
Estimate	61.57	1.10	-1.33	0.74	-1.21		
t-ratio	6.34	14.64	-12.92	2.08	-3.30		
Prob > |*t*|	0.0001	0.0001	0.0001	0.0373	0.0010		
1981 *PLU* Model						0.47	619
Estimate	29.45	1.07	-1.32	0.89	-1.09		
t-ratio	6.56	19.26	-16.25	3.29	-4.21		
Prob > |*t*|	0.0001	0.0001	0.0001	0.0010	0.0001		
1981 *PL10* Model						0.50	619
Estimate	28.68	1.08	-1.32	1.02	-1.34		
t-ratio	6.21	19.31	-16.29	3.97	-4.91		
Prob > |*t*|	0.0001	0.0001	0.0001	0.0001	0.0001		

* *DFE* ≡ degrees of freedom of regression error.

the summary statistics from the deflated regression models. There are several prominent general findings associated with the results appearing on Tables 1 through 3. The key findings are:

1. *ASBV* and *LIBV*—in both the *PLU* and *PL*10 specifications—consistently have coefficients near 1 and −1, respectively, for all three years. Thus, both *ASBV* and *LIBV* have coefficients of the correct sign and magnitude relative to the theoretical values for non-pension assets and liabilities discussed in the first section. However, the coefficient values for *ASBV* and *LIBV* exceed one in absolute value for all but *ASBV* in the 1980 *PL*10 regression. This finding is consistent with the hypothesis that the empirical versions of non-pension

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pension variables in the unscaled regressions ranged from 0.15 to 2.1 in absolute value. While this range of values exceeds that of the pension coefficients reported below, there is no way to determine whether this result is merely sample-specific or induced by spurious correlation.

assets (*ASBV*) and liabilities (*LIBV*) may systematically understate the true values of the theoretical variables.[22]

2. *PA*, *PLU*, and *PL*10 have coefficients that bounce above and below one in absolute value both across years and between specifications. However, all of the pension variable coefficients have the correct signs relative to the theoretical benchmarks of one and zero for *PA*, and −1 and zero for *PL*. The pension asset variable has a range of coefficient values—across specifications and years—of 1.60 to 0.44. The pension liability variable as measured by *PLU* and *PL*10 has a range of coefficient values of −1.82 to −0.83. Although it is never possible to reject the null hypothesis that the absolute value of the pension variable coefficients is equal to one because of high standard errors, it is also not possible to reject the null hypothesis that it is zero in three of six possible cases for the pension coefficients.[23] However, if taken at face value, the finding that the pension coefficients all have point estimates near one in absolute value is consistent with the model discussed in the first section that the pension fund property rights lie fully with the firm; i.e., pension fund assets and liabilities are priced by the marketplace as if they are corporate assets and liabilities.
3. The intercept term is systematically non-zero. The significance of this finding is that it suggests that the empirical models are misspecified, i.e., one or more of the regressors may be measured with systematic error. (Recall that the theoretical model given by equation (1) does not have an intercept term.) The presence of a statistically significant intercept term that is also systematically large in magnitude suggests that the empirical intercept may be picking up some of the explanatory power of some omitted variable.[24] The measurement error analysis discussed below is designed, in part, to address this issue.
4. All independent variables are positively correlated with one another: non-pension assets and liabilities are highly correlated with one another (correlations ≥0.9 each year) and pension assets and liabilities are highly correlated with one another (correlations ≥0.9 each year). The extremely high correlations suggest that multicollinearity is a severe problem that is manifested as high standard errors for the pension variables, *PA* and *PL*. This finding suggests that the netting

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[22] The book value historical cost measures of total assets and total liabilities may systematically understate the market value of total non-pension assets and liabilities, respectively, for a variety of reasons. These include: (1) book value measures do not include measures of off-balance assets and liabilities (such as non-capitalized leases) in their definitions; and (2) book value measures do not adequately capture the magnitude of the many intangible assets owned by the firm, including items such as the value of sales distribution networks and customer relationships.

[23] Note, however, that a specification of the null hypothesis that the absolute value of each of the pension coefficients is equal to zero versus the one-sided alternative that the absolute value of each is less than zero is accepted for only *PA* in the 1980 *PLU* specification at the five percent level. Because zero and one are being offered as competing benchmarks for the absolute value of the pension coefficients, the one-sided significance test for zero may be more appropriate than the two-sided one.

[24] To get an idea of the magnitude of the intercept, note, for example, from Table 1 that the mean of the dependent variable, *MVE*, in the *PLU* specification is approximately 48, 105, and 99, respectively, for the years 1979–1981. By way of contrast, the intercept for each of the corresponding regressions for the three years is approximately 12, 41, and 29.

procedure of the regressors described in the empirical procedures section should be considered.

5. It should be stressed that in spite of the severe collinearity of the regressors and the presence of a nonzero intercept, all of the regression coefficients have the correct sign with respect to their theoretical values in each of the three years. The coefficient values of 1 and -1, respectively, for *PA* and *PL* are consistent with the hypothesis that pension fund assets and liabilities are valued by the marketplace as if they are corporate assets and liabilities.

Two final points concerning the estimation of equations (13a) and (13b) need to be mentioned. First, an additional model specification test was performed which determined that the imposition of the linear constraint that *PA* and *PL* jointly have zero coefficients is unjustifiable. The associated *F*-statistic was significant at better than the one percent level in four of the six cases, and at the two percent and 18 percent levels in the other two cases. If taken at face value, this additional finding suggests that pension assets and liabilities are priced by the marketplace, in addition to non-pension assets and liabilities, when valuing the firms in the FAS 36 sample.

Second, the two-step deflation procedure appeared to solve the problem of heteroscedastic disturbances—at least with respect to *SALES*. Regressions of the log of the squared residuals from the deflated model regressions against the two *SALES* terms given in equation (10) failed to produce significant *F*-statistics. Before turning to the next set of empirical tests, note that the two-step deflation procedure used to reduce heteroscedasticity is also used to estimate each of the remaining regression models in this study. However, only the deflated regression summary statistics are presented and discussed; i.e., the undeflated (heteroscedastic) regression models (from which the deflators are obtained) are omitted, and all references will be made to the variables in deflated form.

Measurement Error in the Regressors

The presence of a large and statistically significant intercept in the basic model regression suggests that one or more of the regressors may be measured with systematic error. In this section, three specific models of measurement error mentioned in the empirical procedures section are presented and discussed:

1. Adjustment of *PLU* to reflect a constant rate of interest will result in measurement of the true pension liability, *PL*, with less error, and thereby produce lower standard errors on the pension coefficients.
2. *ASBV* and *LIBV* systematically understate the market value of corporate assets and liabilities because pension assets and liabilities are excluded from their definitions.
3. *ASCC* (current cost assets) measures the market value of non-pension assets with less error than *ASBV*.

*The PLU/PL*10 *Specification Issue*

The evidence presented in Table 3 indicates that, with respect to the pension variables, there is a difference between the *PLU* or *PL*10 regressions. In particular, all of the pension coefficients are significant in the *PL*10 specifications for each of the three years, enabling us to distinguish between the competing benchmark values of zero and one (in absolute value). This finding provides empirical support for the hypothesis that pension fund property rights lie fully with the firm. However, it is not a reduction in standard errors that appears to be responsible. Rather, it is the movement of the coefficient values for *PA* and *PL* toward 1 and −1, respectively, that produces this result. This is not surprising because the interest rate implicitly imbedded in the unadjusted pension liability figure is typically well below ten percent.[25] Because adjustment of *PLU* to reflect the (higher) ten percent interest rate reduces the pension number, other things being equal, *PL*10 should have a larger coefficient value than *PLU*. Furthermore, because of the high collinearity between *PLU* and *PA*, it appears that the interest rate adjustment also produces the same systematic effect upon the pension asset variable's coefficient.

It appears, then, that adjustment of *PLU* to reflect a constant ten percent interest rate will only likely increase coefficient values for the pension variables (in absolute value) and will not reduce their standard errors.[26] Clearly, it was hoped that pension variable coefficient standard errors could be reduced to enable us to distinguish empirically between the benchmark values of zero and one (−1) for the pension coefficients more cleanly. As a result, only the *PLU* regression specification will continue to be discussed below.[27]

Systematic Mismeasurement of MVA and MVL

Recall from the discussion of the basic model results that in both the *PLU* and *PL*10 specifications, *ASBV* and *LIBV* had coefficient values which systematically exceed one (in absolute value), although only in 1980 are any of the variables' coefficients significantly greater than one in absolute value (*LIBV* in both specifications). Note that this finding is consistent with the hypothesis that *true* market values of non-pension assets and liabilities are systematically understated by their historical cost proxies because the latter two variables fail to include off-balance-sheet assets and liabilities.

The severity of this understatement is, however, probably much less than if *PA* and *PL* were excluded as regressors in equations (13a) and (13b)—given the findings discussed above which show *PA* and *PL* to have non-zero coefficients. One way to test whether this is true is to compare the coefficient values of the non-pension assets and liabilities when *PA* and *PL* are both included and excluded as regressors. If the hypothesis is correct, then the coefficient values of the non-pension variables should move closer to one (in absolute value) when *PA* and *PL* are included as regressors than when they are not.[28]

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[25] Two interest rate figures are reported in the FAS 36 disclosures, one each for the high and low interest rates for all plans that a given firm sponsors. The average of the two figures was used by Landsman [1984], and it is also used in this study. The average high and low reported rates for the years 1979–1981 were, in turn: high: 6.6, 7.04, and 7.44; low: 5.58, 5.73, and 5.81.

[26] Adjustment of *PLU* to reflect a ten percent interest rate would, in fact, also alter the standard error on the adjusted pension liability variable coefficient *if all firms used the same (lower) interest rate to form their accrued benefit pension estimate.* Furthermore, the *t*-values for *PL*10's coefficient would be exactly the same as *PLU*'s since *PL*10 would equal *PLU* multiplied by a constant. The difference in *t*-values must arise because of the cross-sectional difference in interest rates used by the firms in the sample.

[27] The *PL*10 regression results associated with the remaining tests and extensions of the basic model are qualitatively similar to the *PLU* regression results. The *PL*10 results can be obtained from the author upon request.

[28] Several *caveats* are in order. First, note that if *PA* and *PL* are also measured with error, then inclusion of them as regressors may or may not reduce the bias on the non-pension asset and liability coefficients. Second, comparison of the coefficients of the non-pension variables across the two nested models is justifiable from a theoretical perspective only if the estimated intercepts are zero (the theoretical valuation model has no inter-

TABLE 4
REGRESSION SUMMARY STATISTICS WITH PENSION VARIABLES EXCLUDED FROM THE MODEL

MODEL: $MVE_i=\alpha_0+\alpha_1 ASBV_i+\alpha_2 LIBV_i+\epsilon_i$

	α_0	α_1	α_2	R^2	DFE^a
1979				0.43	232
Estimate	11.28	1.09	-1.32		
t-ratio	2.93	10.73	-8.43		
Prob>|t|	0.0037	0.0001	0.0001		
1980				0.24	618
Estimate	36.27	0.93	-1.06		
t-ratio	5.89	13.19	-11.56		
Prob>|t|	0.0024	0.0001	0.0001		
1981				0.46	621
Estimate	25.66	1.07	-1.32		
t-ratio	5.74	20.22	-16.42		
Prob>|t|	0.0001	0.0001	0.0001		

[a] $DFE\equiv$degrees of freedom of regression error.

Table 4 contains the summary statistics associated with the estimation of equation (14), which excludes *PA* and *PL* from the regression model, for 1979–1981:

$$MVE_i=\alpha_0+\alpha_1 ASBV_i+\alpha_2 LIBV_i+\epsilon_i \qquad (14)$$

(Note that it is necessary to estimate only one equation since there is no difference between (13a) and (13b) with *PA* and *PL* excluded from the models.) The coefficient values of *ASBV* and *LIBV* from Tables 3 and 4 are the following:

	Table 3								
	PLU Model			*PL10 Model*			*Table 4*		
	1979	*1980*	*1981*	*1979*	*1980*	*1981*	*1979*	*1980*	*1981*
ASBV	1.08	0.96	1.07	1.07	1.10	1.08	1.09	0.93	1.07
LIBV	-1.31	-1.09	-1.33	-1.30	-1.33	-1.32	-1.32	-1.06	-1.32

It appears that constraining the coefficient values of the pension variables to be zero does not move the coefficients of *ASBV* and *LIBV* closer to 1 and −1, respectively. However, as one can see from the above list of *ASBV* and *LIBV*

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cept), and is justifiable from an econometric standpoint only if the estimated intercepts are the same. Third, there may be a high degree of imprecision in estimation caused by correlations between the non-pension and pension variables, making it less clear how confident one should be with the findings, one way or the other, economically and econometrically.

TABLE 5

BASIC MODEL REGRESSION SUMMARY STATISTICS USING SAME (REDUCED) OBSERVATION SET AS CURRENT COST ASSET REGRESSIONS

MODEL: $MVE_t = \alpha_0 + \alpha_1 ASBV_t + \alpha_2 LIBV_t + \alpha_3 PA_t + \alpha_4 PLU_t + \epsilon_t$

	α_0	α_1	α_2	α_3	α_4	R^2	*DFE*[a]
1979						0.52	93
Estimate	-1.33	1.17	-0.99	1.01	-1.35		
t-value	-0.23	6.13	-3.50	1.09	-2.24		
Prob>|*t*|	0.8172	0.0001	0.0007	0.2771	0.0272		
1980						0.45	400
Estimate	-0.00	1.75	-1.76	-0.01	-1.13		
t-value	-0.49	15.46	-11.97	-0.01	-2.53		
Prob>|*t*|	0.6237	0.0001	0.0001	0.9855	0.0117		
1981						0.56	419
Estimate	15.79	1.49	-1.65	-0.05	0.78		
t-value	1.10	19.05	-14.96	-0.15	-2.62		
Prob>|*t*|	0.2697	0.0001	0.0001	0.8770	0.0089		

[a] *DFE* = degrees of freedom of regression error.

coefficient values, the magnitude of the differences of the coefficient values from the constrained and unconstrained regressions is extremely small.[29] The major implication of these results probably lies not with the specific measurement error model for the non-pension regressors, but with the pension regressors. Recall that the specification test that compared the sum-of-squared residuals (SSR) from (13) to the SSR from (14) determined that *PA* and *PL* jointly do not have zero coefficients.

Replacement of ASBV with ASCC

The final measurement error model seeks to determine whether the regression model given by (13a) is better specified with *ASCC* used in lieu of *ASBV*; i.e., whether *ASCC*—assets at current cost—measures *MVA* with less error than *ASBV*. Unfortunately, data availability of the components of *ASCC* —current cost inventories and net plant—significantly reduced the number of observations available for estimation. Thus, to compare the relative performance of *ASCC* to *ASBV*, it was necessary to re-estimate (13a) using *ASBV* on the reduced set of observations used to estimate the models with *ASCC*.

Tables 5 and 6 contain the summary statistics that accompany the estimation of (13a) using *ASBV* (Table 5) and *ASCC* (Table 6), respectively, on the common (reduced) set of observations. The comparison of the results on the two tables is rather striking. While the coefficient values for *ASBV* in Table 5 are all significant and exceed one in magnitude (ranging from 1.17 to 1.75),

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[29] Although no formal test of significance is performed, it is unlikely that the differences would in fact be statistically significant. Also note that the intercepts listed on Tables 3 and 4 are never equal to one another in any year. This makes it difficult to make inferences based on comparisons of coefficient values for *ASBV* and *LIBV* in the constrained and unconstrained regressions (see previous footnote).

TABLE 6
BASIC MODEL REGRESSION SUMMARY STATISTICS USING CURRENT COST ASSETS

MODEL: $MVE_i = \alpha_0 + \alpha_1 ASCC_i + \alpha_2 LIBV_i + \alpha_3 PA_i + \alpha_4 PLU_i + \epsilon_i$

	α_0	α_1	α_2	α_3	α_4	R^2	DFE[a]
1979						0.40	93
Estimate	14.76	0.06	0.52	2.31	-1.58		
t-value	1.61	1.35	3.10	2.25	-2.33		
Prob>|*t*|	0.1095	0.1775	0.0025	0.0263	0.0277		
1980						0.32	400
Estimate	2.86	0.35	-0.19	2.90	-2.36		
t-value	-4.90	7.78	-1.89	5.09	-4.97		
Prob>|*t*|	0.0001	0.0001	0.0586	0.0001	0.0010		
1981						0.45	419
Estimate	1508.93	0.26	-0.12	1.64	-1.46		
t-value	6.20	7.30	-1.50	4.65	-4.44		
Prob>|*t*|	0.0001	0.0001	0.1333	0.0001	0.0001		

[a] *DFE* = degrees of freedom of regression error.

the coefficient values for *ASCC* (Table 6) are closer to zero in magnitude (ranging from 0.06 to 0.35) and are insignificant in 1979. The other major result to notice from Table 6 is that the coefficient values of non-pension debt—*LIBV*—are also significantly affected, as these coefficients also move toward zero, and in fact, become insignificant. This evidence seems to suggest that current cost assets may add measurement error rather than reduce it (relative to historical cost assets).[30]

EMPIRICAL RESULTS: EXTENSIONS TO INCREASE EFFICIENCY AND PRECISION

In this section, various econometric procedures are employed in an attempt to determine whether the results from the basic model discussed in the preceding section can be made more robust. Recall that because of the relatively high sample standard errors for the coefficients of the pension variables, it was not possible to reject the null hypothesis of zero for *PA* and *PL* in three of 12 (five of 12) possible cases at the five percent (one percent) significance level against the two-sided alternative, even though the point estimates of the coefficients were often near one (in absolute value). This is certainly a problem given the goal to distinguish between the theoretical benchmarks of zero and one for *PA*, and zero and −1 for *PL*. The other finding that makes it difficult to interpret the regression coefficients of the basic model is the presence of a relatively large and significant intercept, a result consistent with the notion that the model is misspecified.

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[30] The finding that current cost assets is a perhaps noisier measure of the market value of total non-pension assets than historical cost assets is consistent with the findings of Beaver and Landsman [1983]. A result of their study which examines the incremental information content of the FAS 33 disclosures suggests that the inflation-adjusted earnings numbers are valued by the market as if they are equal to their historical cost counterparts plus noise.

TABLE 7

F-STATISTICS CORRESPONDING TO A TEST OF A LINEAR RESTRICTION OF THE BASIC MODEL

MODEL: $MVE_t=\alpha_0+\alpha_1 ASBV_t+\alpha_2 LIBV_t+\alpha_3 PA_t+\alpha_4 PLU_t+\epsilon_t$

F-test:
HO: $\alpha_1=-\alpha_2$ and $\alpha_3=-\alpha_4$.
HA: Either $\alpha_1\neq-\alpha_2$ or $\alpha_3\neq-\alpha_4$.

	1979	*1980*	*1981*
F-Statistic	6.94	12.21	31.56
Prob>*F*	0.0012	0.0001	0.0001

The first extension of the basic model addresses the problem of multicollinearity in an attempt to increase precision of the estimated coefficients. The second extension examines whether the use of two GLS procedures that model the cross-sectional and time dependencies of the error structure can increase efficiency and thus reduce standard errors of the pension variables.[31]

Multicollinearity: Net Asset Regression Models

Recall from the discussion of the basic model results that the simple correlations of the pension variables with one another and of the non-pension variables with one another (in deflated form) exceed 0.9. The apparently severe collinearity problem might be reduced by estimating (13a) in net asset form. However, recall that a necessary statistical condition for netting is that $\alpha_1=-\alpha_2$ and $\alpha_3=-\alpha_4$. Table 7 contains the results corresponding to the multivariate *F*-test which implicitly compares the sum of square errors from the unrestricted version of (13a) to those from the restricted model given by (15):

$$MVE_t=\alpha_0'+\alpha_1'(ASBV-LIBV)_t+\alpha_2'(PA-PLU)_t+\epsilon_t' \quad (15)$$

In no case can the null hypothesis that $\alpha_1=-\alpha_2$ and $\alpha_3=-\alpha_4$ be accepted in favor of the alternative that at least one equality does not hold at the five percent level, although we can barely avoid rejecting the null at the one percent level in 1979.

Even though the statistical necessary condition for estimation of the net asset model given by (15) is not met, the model was in fact estimated, with the summary statistics appearing in Table 8. The primary motivation for estimating the net asset models in spite of the failure to meet the statistical necessary condition is that the net pension asset variable—and not its components—has been the vari-

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[31] Several other extensions were considered in an attempt to increase efficiency of estimation and eliminate estimation bias caused by model misspecification—although the results of such extensions offered no new insights and can at best be termed "mixed." One extension, for example, focused on the model misspecification issue raised by the presence of a significantly large nonzero intercept in the basic model regressions. The basic model was estimated in a percentage change form, in which data from two adjoining years are combined. If the basic model was misspecified because of omission of a correlated omitted variable (e.g., off-balance-sheet items such as operating leases) arising from systematic mismeasurement of *MVA* and *MVL*, then percentage change estimation could potentially eliminate the effect of such items on the pension variable coefficients. See Landsman [1984] for a full discussion of the extensions.

TABLE 8

NET ASSET REGRESSION SUMMARY STATISTICS

MODEL:[a] $MVE_i = \alpha_0 + \alpha_1 NETNPA_i + \alpha_2 NETPA_i + \epsilon_i$

	α_0	α_1	α_2	R^2	DFE[b]
1979				0.44	232
Estimate	1102.73	0.82	0.88		
t-ratio	2.54	13.63	1.80		
Prob > $\|t\|$	0.0114	0.0001	0.0721		
1980				0.33	618
Estimate	379.62	0.85	0.88		
t-ratio	4.87	17.05	2.66		
Prob > $\|t\|$	0.0001	0.0001	0.0079		
1981				0.36	621
Estimate	121.03	0.69	1.09		
t-ratio	6.05	17.72	3.69		
Prob > $\|t\|$	0.0001	0.0001	0.0002		

[a] $NETNPA \equiv ASBV - LIBV$; $NETPA \equiv PA - PL$.

[b] $DFE \equiv$ degrees of freedom of regression error.

able on which prior studies have focused. Estimation of (15) offers the opportunity to compare the net pension asset coefficient estimates to those from the earlier studies.

Net non-pension assets, which are defined to be $ASBV - LIBV$, are denoted as *NETNPA* in Table 8. Similarly, net pension assets, $PA - PL$, are denoted as *NETPA*. The expected signs of α_1' and α_2'—given the expected values of the regression coefficients from the unrestricted models (equations (13a) and (13b))—are each positive. Examination of Table 8 reveals that each of the net-pension variable coefficients is significantly non-zero at at least the five percent level, except for 1979 (seven percent level). At an informal level, this compares favorably with the basic model regression results (see Table 3) in which assets and liabilities have unrestricted coefficients. Furthermore, not only are the signs of the coefficients positive, but in no case is it possible to reject the null that the net pension assets have a coefficient value of one (at the five percent level) in favor of the alternative of inequality. This result is similar to the results contained in FS, FM, and Daley. Using Daley [1984] as an illustration, estimates of *UVB*'s coefficients range from roughly 1.0 to 1.75 assuming a tax rate of 50 percent.[32]

The likely cause of the increase in the robustness—the ability to distinguish between values of one (-1) and zero for the pension variable coefficients—is most likely attributable to the reduction in the collinearity of the remaining regressors: the simple correlations of the two net asset terms ranged from -0.02 to 0.14 over the three-year period.

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[32] It is necessary to make a tax-adjustment to Daley's estimates of *UVB*'s coefficients because his definition of *UVB* includes the term $(1-\tau_c)$, i.e., he defines *UVB* to be equal to $(1-\tau_c)(PL-PA)$, where τ_c is the corporate tax rate. It is also necessary to multiply his coefficient estimates by -1 because $NETPA = -(1-\tau_c)UVB$.

Although netting appears to increase robustness by permitting statistical distinction between zero and one (in absolute value) for the pension variable coefficients, bear in mind the *caveat* that the necessary statistical condition for netting the two pension and non-pension terms was not met. Attention now turns to whether specific attempts to model any correlations in the error structure can achieve the same goal of reducing standard errors of the pension variables.

SUR and EC Estimation Results

Two specific models of the variance-covariance matrix of the disturbance from the basic model (equations (13a) and (13b)) that exploit any apparent cross-sectional or time dependencies are considered: the Seemingly Unrelated Regressions Model (SUR) and the Error Components model (EC). Before discussing the estimation results from these two models, note that because of a software limitation that the estimation problem be balanced—i.e., the composition of each year's cross-section had to be the same—the number of firms (cross-sectional units) used in the estimation of each GLS model was roughly reduced to the number of firms available in the year with the smallest number of observations. This limitation severely reduces the number of observations available to both the SUR and EC estimation procedures. Furthermore, to facilitate comparison of the SUR and EC results to the basic model results, it is necessary to re-estimate the basic model regressions on the common set of observations to each procedure. Table 9 contains the basic model regression summary statistics that correspond to the SUR observation set and the SUR regression summary statistics. Table 10 contains the basic model regression summary statistics that correspond to the EC observation set and the EC regression summary statistics.[33]

SUR Results

A comparison of the summary statistics from the SUR regressions (Table 9, Panel B) to those from the corresponding basic model regressions (Table 9, Panel A) indicates neither set of regression estimates to be very impressive. In particular:

- For the basic model, the pension asset coefficient is insignificant in 1979 and 1980, and even has the wrong sign in 1980. Also, the pension liability coefficient is insignificant in 1980.
- For the SUR model, as with the basic model, the pension asset coefficient has the wrong sign in 1980 and is insignificant in 1979 and 1980, and the pension liability coefficient is insignificant in 1980. However, in contrast to the basic model case, the estimated coefficient of the pension liability is close to zero.

The relatively poor estimation results for both the SUR and basic models could clearly be attributable to the imposition of a balanced set of equations which reduced the number of observations to 219 in each year.[34] It is difficult to compare the relative performance of the SUR estimators to those from the basic model along an efficiency dimension because of (1) the poor estimation results apparently caused in part by the reduction in the observation set and (2) a different deflator used in each estimated

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[33] Recall that the error components model constrains the coefficients across the three years to be the same, effectively pooling observations not only cross-sectionally but across time as well.

[34] Both the *SUR* and basic models were re-estimated, throwing out 1979 (the year with the greatest number of missing observations). Although the results improve for both the *SUR* and basic model regressions, there is still no clearly superior set of results.

TABLE 9

PANEL A: BASIC MODEL REGRESSION SUMMARY STATISTICS USING SEEMINGLY UNRELATED REGRESSIONS OBSERVATION SET

PANEL B: SEEMINGLY UNRELATED REGRESSION SUMMARY STATISTICS

MODEL: $MVE_i=\alpha_0+\alpha_1 ASBV_i+\alpha_2 LIBV_i+\alpha_3 PA+\alpha_4 PLU_i+\epsilon_i$

Panel A	α_0	α_1	α_2	α_3	α_4	R^2	*DFE*[a]
1979						0.41	214
Estimate	2.03	1.21	-1.59	1.09	-1.03		
t-value	3.58	9.11	-7.83	1.73	-2.03		
Prob>|*t*|	0.0004	0.0001	0.0001	0.0846	0.0433		
1980						0.67	214
Estimate	0.01	2.37	-3.18	-0.46	-0.44		
t-value	0.63	13.39	-11.54	-0.94	-1.11		
Prob>|*t*|	0.5285	0.0001	0.0001	0.3440	0.2645		
1981						0.46	214
Estimate	0.36	1.09	-1.43	1.19	-1.36		
t-value	4.66	10.97	-9.64	2.71	-3.03		
Prob>|*t*|	0.0001	0.0001	0.0001	0.0071	0.0027		

Panel B[b]	α_0	α_1	α_2	α_3	α_4
1979					
Estimate	0.74	1.43	-1.77	0.22	-0.65
t-ratio	1.91	15.87	-12.65	0.58	-2.17
Prob>|*t*|	0.0572	0.0001	0.0001	0.5587	0.0309
1980					
Estimate	0.01	2.10	-2.64	-1.02	-0.08
t-ratio	0.45	17.45	-13.67	-3.24	-0.35
Prob>|*t*|	0.6508	0.0001	0.0001	0.0013	0.7215
1981					
Estimate	0.30	1.18	-1.46	0.57	-0.89
t-ratio	3.50	17.12	-13.84	2.12	-3.23
Prob>|*t*|	0.0006	0.0001	0.0001	0.0346	0.0014

[a] *DFE*≡degrees of freedom of regression error.

[b] Number of observations per model=219. R^2 is not computed.

equation—i.e., different variables are used in the SUR and basic model regressions. However, if one interprets the SUR results to be less impressive than the basic model results, one possible interpretation is that the imposition of the SUR assumption requiring that the error terms for each firm in the sample be correlated across time (in exactly the same way) results in a reduction instead of increase in efficiency.

EC Results

Recall that EC estimation imposes the restriction that the observations across years be pooled—the resulting model is a

TABLE 10

PANEL A: BASIC MODEL REGRESSION SUMMARY STATISTICS USING ERROR COMPONENTS REGRESSION OBSERVATION SET

PANEL B: ERROR COMPONENTS MODEL REGRESSION SUMMARY STATISTICS

MODEL: $MVE_i=\alpha_0+\alpha_1 ASBV_i+\alpha_2 LIBV_i+\alpha_3 PA_i+\alpha_4 PLU_i+\epsilon_i$

Panel A	α_0	α_1	α_2	α_3	α_4	R^2	*DFE*[a]
						0.37	652
Estimate	3.99	1.24	-1.65	0.96	-1.17		
t-value	7.39	16.24	-14.31	3.01	-3.80		
Prob>|t|	0.0001	0.0001	0.0001	0.0026	0.0002		

Panel B[b]	α_0	α_1	α_2	α_3	α_4
Estimate	213.76	1.13	-1.40	0.30	0.48
t-ratio	3.20	12.90	-10.49	1.39	-1.93
Prob>|t|	0.0014	0.0001	0.0001	0.1647	0.0531

[a] *DFE* = degrees of freedom of regression error.

[b] Number of observations per model = 657. R^2 is not computed.

pooled time series/cross-sectional regression. Panels A and B of Table 10 contain the summary statistics corresponding to the basic model and EC regressions, respectively, estimated on the (common) pooled observation set.

Looking first at the basic model regression results in Panel A, we find that the coefficients for the pension asset term (*PA*) and pension liability term (*PLU*) are significant at better than the one percent level. Furthermore, the coefficients of *PA* and *PLU* are insignificantly different from 1 and −1, with point estimates close to one in absolute value.

Examination of Panel B reveals a very different set of results under the EC model estimation. The point estimates for the coefficient values are all much lower than their basic model counterparts, and all are less than one in absolute value. Furthermore, only *PLU*'s coefficient is significantly different from zero.

Although a comparison of the standard errors from the EC and basic model regressions is not valid because different deflators are used, the two estimation procedures do appear to suggest very different coefficient values for the pension variables. In particular, the results suggest that if the EC assumptions are valid, then pension assets and liabilities may have coefficients closer to zero than the basic model results indicate. However, if the EC assumptions, i.e., the constraints imposed on the coefficients and the error structure, are not valid, then incorrect application of the EC model could bias the sample estimates of the coefficients and the standard errors.[35]

SUMMARY AND CONCLUSIONS

The major goal of this paper was to

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[35] This form of model misspecification is likely to be more severe than the incorrect imposition of the SUR assumptions on the data, since OLS is just a limiting case of SUR in which there is no mutual correlation of errors across models.

look for empirical evidence of the relationship between pension fund assets and liabilities and the market value of shareholder equity. The results of the basic model are consistent with the theoretical benchmark pension coefficients for the case in which pension fund property rights lie fully with the firm—i.e., the market prices pension fund assets and liabilities as corporate assets and liabilities. Because of a lack of robustness associated with the empirical coefficients of the pension variables, several empirical extensions were examined to reduce the standard errors on the pension coefficients. Unfortunately, for a variety of reasons, the extensions—taken as a whole—did not provide the desired increase in robustness.

Another pervasive problem—the presence of a large, non-zero, statistically significant intercept term throughout the study—suggests that the empirical model may have been misspecified. In particular, the intercept term may have been capturing the effect of a potentially correlated omitted variable that arises from the systematic misstatement of some or all of the regressors, especially the non-pension variables. To the extent that such a variable is correlated with the pension variables, the conclusions drawn from the results in this study must be drawn with care. Clearly, an important future extension to this study is to develop ways to address this issue.[36]

However, if the empirical findings of this study are taken at face value, then there may be implications concerning the allegations of accounting policy makers that unfunded pension obligations are really off-balance-sheet corporate liabilities. Such allegations have given rise to a new disclosure rule contained in FAS 87, requiring the recognition of the unfunded pension obligation as a liability in the body of the financial statements of firms affected by FAS 36. The coefficient values for pension assets and liabilities determined in this study suggest that there may be some merit to the FASB's contention that the unfunded pension obligation is in fact a debt obligation of the firm (and conversely, a negative unfunded pension obligation is an asset of the firm).[37] However, it is important to note once again that until the several empirical problems cited above are resolved, the results of this study should be interpreted with care.

With respect to prior research, the empirical results of this study are consistent with those of FS, FM, and Daley. In particular, as noted in the section on multicollinearity, the net asset model produced coefficient estimates for net pension assets similar to Daley. Although the point estimates for the pension liability (*PL*) and net pension assets (*PA* −*PL*) are consistent with the Miller model benchmark of −1, the standard errors were consistently too high to reject the FS, FM, and Daley predicted value of approximately −0.5. One obvious future empirical extension to this study is to explore why the pension variables produce coefficients with high standard errors relative to the non-pension variables. Such research may help resolve the empirical issue of how the pension liability is priced. Another important empirical extension, as noted above, is to design a way to address the presence of the non-zero intercept term.

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[36] One possible extension that attempts to deal with the significant intercept term is to estimate the empirical model on a subsample of "no-growth" firms. Because the theoretical pension coefficients as derived in the first section are a function of firm-specific growth rates, to the extent that the empirical sample firms are not zero-growth firms, the pension coefficient estimates will be an average of the individual firms' coefficients. It is possible that the non-zero intercept is an artifact of this averaging phenomenon.

[37] Although FAS 87 requires recognition of a liability to the extent that the unfunded pension obligation is positive, no provision is made for an asset if the unfunded pension obligation is negative. The results of this study are not consistent with this asymmetrical treatment of the unfunded pension obligation.

Equally as important as the empirical extensions to this study is the need to explore the theoretical properties of the balance sheet equation-based model on which the empirical tests are based. In particular, because the model is new to the equity valuation model literature, much research remains to be done—especially in the area of comparing the theoretical properties of the balance sheet equation-based model to those of the *earnings*-based approach adopted by FS, FM, and Daley. Such a comparison could be done both in a pension and non-pension context (i.e., with pensions included and omitted from the comparison).

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Labor Union Contract Negotiations and Accounting Choices

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ABSTRACT: This paper examines the hypothesis that managers reduce reported earnings during labor union contract negotiations relative to earnings released before and after contracts are negotiated. Analyzing earnings around labor negotiations provides evidence regarding when managers manipulate accounting earnings and, hence, information regarding the costs and benefits of managing earnings. We find no evidence of lower than expected earnings during negotiations. Time series of quarterly and annual unexpected earnings, using several measures of expected earnings, are examined around labor talks for a sample of 105 unionized companies over the period 1968–1981. Both random and matched samples of firms not engaged in labor negotiations also are chosen. The time series of earnings during labor talks for the unionized sample is indistinguishable from that of the random and matched samples. An analysis of these firms' quarterly earnings time-series properties and their abnormal stock returns suggests that in this sample period unionized firms had less incentive to reduce earnings because they already were performing poorly.

PRIOR research finds that managers' accounting choices are systematically affected by firm contracts based explicitly on accounting numbers and situations which implicitly use accounting numbers.[1] Management compensation plans and corporate bond covenants often are based explicitly on accounting numbers. The evidence suggests that these contracts and their specific terms influence managers' accounting choices. Government regulatory agencies (e.g., public utility rate regulators) that explicitly use accounting numbers to restrict managers' actions also affect managers' choices of accounting procedures. In addition, the firm's political sensitivity, frequently measured by firm size, appears to affect managers' accounting decisions even though accounting numbers are used only implicitly in the political process (see Christie [1986] for relevant studies).

This paper analyzes another set of corporate contracts hypothesized to affect managers' accounting choices—labor contracts.[2] Unlike most executive compensation contracts and debt agreements, few labor contracts are explicitly based

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[1] Holthausen and Leftwich [1983] and Watts and Zimmerman [1986, Chapter 11] review the literature.

[2] See Watts and Zimmerman [1978, p. 117]; Watts and Zimmerman [1986, Ch. 10]; Holthausen and Leftwich [1983, p. 87]; and Larcker and Balkcom [1984, p. 9].

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on accounting numbers,[3] although a leading labor economics textbook suggests that earnings are used in labor contract negotiations: "If profits are high and the business outlook is good, [the union leader] can afford to make large demands. If business is declining and profits are failing, he may have to be content with holding the present wage level" [Reynolds, 1978, p. 390]. The financial press provides additional examples:

> Mr. Fraser (United Auto Workers) and Thomas Miner, Chrysler's vice president of labor relations, both noted that because of the company's weak financial condition and the auto industry's continued poor outlook, workers couldn't expect big gains in this pact [*Wall Street Journal*, 9/17/82].
>
> The union (United Auto Workers) says it deserves some wage-and-benefit gains. It points to the company's (Caterpillar) earnings of $3 billion for the past six years . . . [*Wall Street Journal*, 10/6/82].

The hypothesized effect of reported accounting numbers on labor negotiations is similar to the hypothesized effect of earnings on the political process. In both cases, managers' reports of lower earnings are assumed to affect the process implicitly. Voters, politicians, and union members presumably do not adjust completely the reported numbers for managers' expected manipulations because such adjustments are costly. The existence of information costs is assumed to create incentives for managers to report lower earnings, thereby influencing both the political process and labor talks. The two situations differ if labor unions have greater incentives to undo managers' manipulations or have lower information costs than participants in the political process.

This paper develops and tests the hypothesis that managers reduce earnings released during contract talks relative to earnings released before and after the negotiations. Analyzing earnings around labor negotiations provides evidence regarding when managers manipulate accounting earnings and, hence, information regarding the costs and benefits of managing earnings. The evidence in this study is inconsistent with the view that managers depress earnings during contract talks.

The next section discusses how accounting earnings might affect labor talks, followed by a section explaining the data sources and sampling procedures. A fourth section describes our research method, which is to examine various time series of quarterly and annual unexpected earnings around contract negotiations. A section on results indicates no evidence that managers of unionized firms report lower than expected earnings during labor negotiations. Several measures of expected earnings are employed. Both random and matched samples of firms not engaged in labor negotiations also are chosen. The time series of earnings during labor talks is indistinguishable from that of the random and matched samples. However, the quarterly earnings time-series properties of firms with labor contracts differ from those of the random sample. In particular, over the sample period of 1974–1981, the firms with labor contracts exhibit, on average, a downward drift in seasonally differenced quarterly earnings as compared to the random sample. The drift also occurs in the sample of firms matched by firm size and industry. An analysis of these firms' abnormal stock returns indicates that this negative earnings drift is consistent with their generally poor real operating performance which was anticipated by the stock market. This finding suggests that in this sample period, unionized firms had less incentive to reduce earnings because they already were performing poorly. A final section interprets and summarizes the findings.

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[3] In rare cases, union members' wages are explicitly tied to reported earnings. Eastern Airlines, for example, has a union contract directing the firm to pay back workers 3.5 percent in withheld wages plus a bonus of as much as 3.5 percent if Eastern earns at least two percent on revenue [*Wall Street Journal*, 9/17/82].

DEVELOPMENT OF THE HYPOTHESIS

The accounting literature and popular press present the hypothesis that managers manipulate earnings surrounding labor contract talks. This section explores a possible argument for this hypothesis. The argument assumes unions want information regarding the firm's economic rents, and accounting earnings provide information about economic rents. It is then asserted that the benefits to managers of depressing earnings during contract talks exceed the costs.

Economic rents either arise from monopoly profits or are the returns from previous firm-specific investments (i.e., quasi-rents). Economic rents affect union bargaining if either of two models of labor unions is adopted: the *monopoly model* that assumes the union maximizes the wage bill [Cartter, 1959, pp. 80–84; Rees, 1973, pp. 126–133; and Baldwin, 1983] or the *bargaining model* that assumes the union uses its power to strike to appropriate some of the firm's (quasi- or monopoly) rents [Ashenfelter and Johnson, 1969 and Tracy, 1985]. Under the monopoly model, the firm's rents are likely correlated with the firm's derived demand for labor. As a rational monopolist, the union provides labor up to the point at which the marginal revenue of supplying labor is equated with its marginal cost. Under the bargaining model, the union's resolve to strike depends on the firm's economic rents. As profits increase, the union expects larger wage concessions. To increase the probability of realizing these concessions, the union uses its power to strike as a bargaining device. Under both the monopoly and bargaining models of unions, economic rents affect the union's demand.

Accounting earnings act as surrogates for economic rents as long as less costly alternative sources do not provide similar or better information on rents. If unions can observe outputs, inputs, and prices, then alternative sources of information on economic rents exist. In addition, if unions can collect and organize these sources to provide, at less cost, similar or more accurate information than accounting earnings, unions will not rely on reported profits as surrogates for economic rents. Therefore, the hypothesis that managers manipulate reported earnings surrounding contract talks requires the assumption that alternative information sources do not eliminate totally the unions' reliance on accounting earnings.

The anticipated benefits to managers of manipulating earnings are the lower wage bills. That is, wages will be higher if earnings are not reduced during contract talks. Managers' costs of manipulating earnings are (1) the increased default costs due to greater likelihood of technical default on bond covenants, and/or (2) reduced managerial pay from executive compensation packages based on reported earnings. Both of these costs are bounded by the non-zero costs of renegotiating debt and/or compensation contracts. Presumably, these renegotiation costs are low since debtholders and shareholders benefit from lower wage bills, *ceteris paribus*.

The benefits of manipulating earnings

can be diminished for several reasons. First, labor officials can adjust the reported earnings, to some extent undoing accounting manipulations. If the information used in making these adjustments is costless, union leaders can adjust earnings completely. Hence, the hypothesis that managers depress reported earnings during labor talks requires the assumption that these information costs are positive. Second, union leaders may learn over time of managers' manipulations. Contract talks usually occur every three years. In this repeated game, it is assumed that either managers do not reduce earnings during every negotiation or that turnover in union leadership precludes unions from completely adjusting earnings. The validity of these various assumptions is an empirical issue.

Given that managers have incentives to manipulate earnings, the manipulation can take several forms. By deferring revenue recognition or accelerating cost recognition, reported earnings during labor negotiations are reduced and earnings following the talks are raised relative to what they would have been absent management's manipulations. Such accounting effects can be induced by altering accounting accruals [Healy, 1985]. For example, obsolete inventories can be written off or allowances for uncollectible receivables can be increased unexpectedly in the current period. Future period earnings will be higher than previously anticipated to the extent inventory write-offs and uncollectible allowances are lower. Such accounting accrual decisions do not involve changes in accounting procedures (e.g., changing depreciation methods) and are within the scope of management's normal discretion. Moreover, the accrual manipulations are implemented more easily during the first three fiscal quarters since these earnings are not audited. It is unlikely that managers will change accounting procedures during contract talks since these manipulations are easily observed and the repeated game nature of labor contracts necessitates switching back to the previous procedure after the talks. Hence, this paper examines the time-series pattern of earnings surrounding labor contract talks. In particular, earnings released during contract talks are hypothesized to be lower than earnings released before and after negotiations.

DATA SOURCES

The information regarding union employers, unions, and contract negotiation dates was drawn from two sources. The *Wage Calendar*, published yearly by the U.S. Department of Labor, lists bargaining agreements that cover at least 5,000 employees and that are scheduled to expire in the calendar year. The *Wage Calendar* only follows selected industries, however, so the *Wall Street Journal Index* (*WSJI*) was searched for additional contract signings during the period 1965–1981. Since our tests are conducted on both annual earnings and quarterly earnings, annual and quarterly contract samples were constructed. To be included in the samples, labor contracts identified in the *Wage Calendar* or *WSJI* must meet the following criteria:

1. The negotiating employer is a company with annual earnings data on Compustat for the negotiation year and the following year, or quarterly earnings data, including earnings release dates, on Compustat for the period 1974–1981;
2. The contract is negotiated during the years 1965 through 1981 for the

annual analysis or the years 1974 through 1981 for the quarterly analysis;[4]

3. For annual analysis purposes, the company is listed in *Moody's Industrial Manual* and reports on a calendar-year basis. A calendar-year basis is chosen to simplify assumptions regarding timing of earnings releases (see section on tests of annual data [pp. 709–710]).
4. If the company negotiates with several unions, all labor contracts expire on the same date (If contracts expire at different times, management's incentive to shift income across periods is reduced.);
5. Twenty percent or more of the firm's employees are covered by the contract. Alternative cut-offs of zero and 50 percent also were used without altering the results. The *Wage Calendar* lists the number of employees covered by the contract and Compustat's annual database lists the total number employed.

Table 1 summarizes the data collection results. In the annual sample, each labor contract is negotiated every three or four years, except for ten contracts (representing nine different firms) which cover only 18 months to two years. In the quarterly sample, four contracts of four firms cover less than three years. For the annual and quarterly samples, 576 and 303 company-year contract observations, respectively, are available from the *Wage Calendar* and 658 and 401 are available from the *Wall Street Journal* (*WSJ*). The final annual sample size of 242 contracts represents 105 firms, while in the quarterly sample, 134 contracts represent 85 firms. For both the annual and quarterly contract samples, about 40 to 50 percent of the observations are lost because the necessary financial information regarding the company is not available on Compustat.

RESEARCH METHOD

This section describes tests of the hypothesis that managers depress earnings during contract talks. Quarterly and annual accounting earnings reported during contract talks were compared to earnings reported at other times. In conducting these tests, certain issues were addressed, such as timing issues involving earnings release dates, the construction and use of control samples of firms, and the selection of earnings expectation models. These issues are discussed in the following subsections.

Timing Issues

Testing whether earnings are reduced during union negotiations requires specifying the particular quarter's or year's earnings number subject to management manipulation. Examining the *WSJI* for 1974–1978 revealed the opening date of negotiations was reported for 19 contracts listed in the *Wage Calendar*. In these instances, the mean duration of the talks was 2.53 months, indicating that, on average, only one quarterly earnings report is released during contract talks. Four of the 19 contract talks exceeded three months. Quarterly or annual earnings numbers released just prior to contract approval are defined as the "negotiation period earnings" and denoted as

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[4] The year 1965 was selected for the annual earnings tests because this was the first year labor contracts were reported in the *Wage Calendar*. The year 1974 was selected for the quarterly tests because the 1983 Compustat files do not have quarterly earnings data available prior to 1973. Note that mandatory wage and price controls (Nixon's Phase II) were in effect from 11/14/71 to 1/11/73 [Ruback, 1982]. Those controls precede the quarterly test period, but they fall in the middle of the annual earnings test period. Excluding observations during wage and price controls does not alter the results of the annual tests.

TABLE 1

SUMMARY STATISTICS OF THE QUARTERLY AND ANNUAL CONTRACT SAMPLE SELECTION PROCEDURE. ORIGINAL SAMPLE SIZE BY SOURCE, NUMBER OF CONTRACTS DELETED FOR VARIOUS REASONS, AND FINAL SAMPLE SIZE.

	Samples			
	Annual		*Quarterly*	
Number of contracts listed in *Wage Calendar*				
1968–1981	576			
1974–1981			303	
Number of contracts reported in *Wall Street Journal*				
1965–1981		658		
1974–1981				401
Less:				
a) Contracts where company not listed in *Moody's Industrial Manual*	5	—	—	—
b) Contracts listed in *Wage Calendar*	—	89	—	42
c) Contracts where company not on calendar year	43	61	—	—
d) Contracts where information not available on Compustat	240	242	113	222
e) Contracts where employer negotiated with several unions in overlapping time periods	72	82	33	60
f) Contracts covering less than 20% of all employees	56	102	70	30
Total by Source	160	82	87	47
Final Sample (all sources):				
Total number of contracts	242		134	
Number of companies	105		85	
Final sample as a percentage of total possible sample	19.6%		19.0%	

$t=0$ earnings. For example, suppose a contract is signed on August 1, 1976. If earnings for the second quarter ended June 30, 1976 are released in July, the second quarter would be considered as "negotiation period earnings" and denoted $t=0$. If the second quarter's earnings are released in August, the first quarter's income is denoted $t=0$.

Determining the "negotiation period earnings" requires a comparison of the earnings release date to the date the contract was approved. The contract approval date is not available for all the contracts selected from the *Wage Calendar*. Restricting the sample to only those cases where both earnings release dates and contract approval dates are available reduces the sample size by roughly two-thirds. Accordingly, the following procedures determine the negotiation period earnings for the quarterly tests. (The procedure for defining the negotiation period earnings for the annual tests is described later.)

1. For those observations selected from the *Wage Calendar*, the contract approval date is assumed to be the date reported in that publication as the beginning of the new contract period. If the *WSJI* indicates a different date, that date is used as the contract approval date.
2. The negotiation period ($t=0$) is defined as the latest quarter of the fiscal year for which the earnings release date reported on Compustat precedes the contract approval date.

The tests reported in this paper examine the one quarterly earnings number released prior to contract approval or the beginning of the new contract. Subsequent tests reveal that combining quarters $t=0$ and $t=-1$ or defining quarter $t=-1$ as the negotiation quarter does not alter the results.

Control Samples

Two control samples are selected: a random sample and a matched sample. A random sample of 85 firms was chosen to provide information regarding how the contract sample differs from an average Compustat firm. Specifically, every 28th firm of the alphabetically ordered Compustat Quarterly Industrial file was selected to obtain a total of 85 firms. If a randomly selected firm also appeared in the contract sample, it was disregarded and the next alphabetical firm was selected. Each random sample firm was assigned the contract dates of a contract sample firm, where both samples were alphabetically organized.

A sample of matched firms also was selected to control for possible industry and size effects on the unionized firms' performance. All the tests were replicated substituting this matched control sample for the randomly selected control sample. The matched control sample was constructed by selecting firms in the same four-digit SIC industry with 1978 sales within 25 percent of the contract firm's 1978 sales. When a match did not exist at the four-digit SIC level, three-digit and then two-digit industries were examined for possible matches. Firms that engaged in union contract negotiations but failed to meet the criteria for inclusion in the contract sample were not included in the matched sample. The process reduced the original sample size by 32 percent, from 134 contracts to 91 contracts, because 23 firms could not be matched at the two-, three-, or four-digit SIC level. Contract firms without suitable matches are predominantly in the auto, can, farm equipment, and electrical equipment manufacturing industries.

The matched sample is composed of 61 contracts matched at the four-digit SIC level, seven contracts matched at the three-digit level, and 23 contracts matched at the two-digit level. The matched and random samples produce very similar results, except where noted.

Table 2 summarizes the differences between the contract and random samples. The first two columns indicate that the mean 1978 sales, total assets, number of employees, market value, and the ratio of long-term debt to market value of the contract firms exceed the respective means of the random sample firms at the .05 level (two-tail t-test).[5] These

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[5] Since some of the firms have multiple labor contracts, data for the year 1978 are used to compare the contract and random sample firms. This procedure prevents firms with multiple contracts from dominating the results by entering the comparison more than once. The year 1978 is chosen because it is the middle year of the quarterly contract sample period.

TABLE 2

COMPARISON OF CONTRACT SAMPLE AND RANDOM SAMPLE FIRMS IN 1978
(LEVELS IN MILLIONS OF DOLLARS)

	1978 Levels			*Ratio of 1981 to 1974 Levels*		
	Contract Sample		*Random Sample*	*Contract Sample*		*Random Sample*
Number of firms*	85		85	85		85
Mean Sales	$3,537		$ 675	1.987		3.115
Standard Deviation	8,550		1,353	.761		3.417
Median	980		191	1.785		2.328
t-statistic		3.05***			-2.88***	
Mean Total Assets	$2,464		$ 580	1.909		2.636
Standard Deviation	4,602		1,066	.628		2.465
Median	942		187	1.880		2.000
t-statistic		3.68***			-2.56***	
Mean Number of Employees	48,984		10,003	1.037		1.992
Standard Deviation	114,776		18,664	.483		3.202
Median	18,195		2,762	.982		1.206
t-statistic		3.07***			-2.62***	
Mean Firm Market Value**	$1,420		$ 480	2.255		4.529
Standard Deviation	2,570		1,091	1.141		6.679
Median	561		121	1.991		2.467
t-statistic		3.10***			-3.02***	
Mean (Long-Term Debt/ Market Value)	.389		.309	1.081		1.091
Standard Deviation	.208		.228	1.148		1.652
Median	.394		.287	.856		.812
t-statistic		2.39***			-.04	
Mean (Net Income/Total Assets)	-.041		.059	.836		.545
Standard Deviation	.880		.089	3.350		10.060
Median	.047		.067	.984		.905
t-statistic		1.04			.25	
Mean Market Model Beta	.851		1.010			
Standard Deviation	.321		.413			
Median	.799		.932			
t-statistic		-22.16***				

* Firms remaining after excluding contracts where less than 20 percent of employees are covered.

** Book Value of Long-Term Debt + Book Value of Preferred Stock + Market Value of Common Stock at Year-End.

*** Difference in means of contract and random sample firms is significant at .05 level (two-tail *t*-test).

findings reveal that our sample of contract firms is biased toward larger firms. The contract firms also have statistically significantly smaller common stock betas. While not statistically significant, the contract firms have lower returns on assets than the random sample firms in 1978. Additional evidence on the relative profitability of the two samples is provided in the section on test results.

The last two columns of Table 2 report growth ratios for the two samples over the period 1974–1981. The contract sample experienced nominal growth in sales, assets, number of employees, and market value. The random sample experienced statistically significantly greater growth in these variables over the same period.

Recomputing the Table 2 summary statistics using the matched sample and the reduced contract sample (not reported) produces no statistically significant differences in any of the first two columns' variables, except that the unionized firms continue to have a lower mean market model beta (*t*-statistic of −8.46). Thus, the matching procedure controls for firm size, number of employees, market value, and leverage. However, some mean growth ratios still differ significantly betwen the contract and matched samples. The ratios of 1981 to 1974 levels for sales and market values are lower for the contract than the matched samples (*t*-statistics of −1.72 and −2.17, respectively). The matched sample performed better than the unionized firms over the period 1974 to 1981.

Earnings Expectation Models

To assess whether annual or quarterly earnings are manipulated by management, we compare actual to expected earnings for all negotiation and surrounding periods. Annual earnings are assumed to follow a random walk. Unexpected annual earnings are then the difference between the current year's and the previous year's earnings.[6] Unexpected quarterly earnings are estimated using two expectations models. The first model [see Foster, 1977 and Benston and Watts, 1978] accounts for the seasonality of quarterly earnings and any trend contained in the most recent quarterly income figures. Unexpected earnings for firm *i* at quarter *t*, FE_{it}, are calculated as:

$$FE_{it}=Q_{it} -(Q_{it-4}+\hat{a}_i+\hat{b}_i(Q_{it-1}-Q_{it-5})) \qquad (1)$$

where Q_{it} is firm *i*'s earnings per share in the year *t* and $\hat{a}_i$ and $\hat{b}_i$ are the estimated coefficients.

Forty quarters of earnings data, the maximum available on Compustat, are employed in the analysis.[7] Reported tests use nominal earnings per share figures adjusted for changes in the number of shares. (Deflating earnings in quarter *t* by the Consumer Price Index at the start of quarter *t* does not alter the findings.) All quarters except negotiation quarters are included in the estimation.[8] As an alternative estimation procedure, only quarters preceding the negotiation quarter are used, provided that at least ten quarterly observations are present. This alternative procedure, whereby the earnings expectation model is re-estimated for each contract negotiation, produces results (not reported) very similar to those reported.

The second quarterly expectations

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[6] Analysts' forecasts were not used as expected earnings because analysts might factor into their forecasts managers' income-reducing tendencies surrounding labor contract negotiations, thereby reducing the power of the tests.

[7] Compustat figures are the final earnings numbers, not the "as reported," preliminary numbers in the *WSJ*. To check the possibility that managers release lower preliminary numbers during contract negotiations and report higher final numbers, we compared the Compustat figures to earnings as announced in the *WSJI*. Tests based on a subsample of the firms over the fiscal years 1974–1978 failed to reject the null hypothesis that earnings revisions and negotiation quarters are independent.

[8] The negotiation quarter is excluded only when calculating the dependent variable $Q_{it}-Q_{it-4}$, where the negotiation quarter is Q_{it}. This results in about one of every 12 observations being deleted (since labor contracts generally are negotiated every three years).

model employed assumes expected earnings this quarter are equal to actual earnings four quarters ago. Hence, unexpected earnings are:

$$FE'_{it}=Q_{it}-Q_{it-4} \qquad (2)$$

Neither unexpected earnings model controls for real production (cash flow) effects produced by union wage negotiations. For example, if wages rise following negotiations, earnings in quarters +1, +2, . . . are lower than in quarter 0. The lack of Compustat data on total wage bills precludes adequate control for these wage adjustments. Accordingly, the tests assume these effects are small and do not mask managers' accounting manipulations.

Besides testing whether unexpected annual earnings in negotiation periods differ from unexpected earnings in non-negotiation periods, unexpected annual accounting accruals also are examined.[9] Using accounting accruals is a more powerful test if accruals are subject to managerial manipulation surrounding contract talks and cash flows are not manipulated. Annual accruals are assumed to follow a random walk. The hypothesis is that management manipulates accounting accruals (the difference between reported earnings and cash flows) during contract negotiations. Three approximations of accounting accruals are used: (1) the sum of the changes in accounts receivable and inventories less the sum of depreciation, the change in accounts payable, the change in income taxes payable, and deferred taxes (see Healy [1985]); (2) the change in accounts receivable; and (3) the change in inventory balances. For each of the three accrual measures, the total accruals for the negotiation period and the preceding period are compared. Increases or decreases in a measure from one period to the next are noted.

TEST RESULTS

The test results do not support the hypothesis that managers depress earnings released during labor contract talks. The quarterly results are presented first, followed by the annual results.

Tests of Quarterly Data

As described above, equation (1) is used as one method for estimating unexpected quarterly earnings in the negotiation quarter. Individual time-series models are estimated for each firm in the contract, matched, and random samples using up to 35 quarterly observations. The fewest number of observations in any estimation is 20. We first present various time series of quarterly earnings surrounding the negotiation quarter. Then the results of estimating expected quarterly earnings time-series models and their interpretations are presented.

The Time-Series Behavior of Quarterly Earnings Surrounding Labor Negotiations. The analysis examines the time-series behavior of earnings surrounding the negotiation quarter (quarter 0). To measure unexpected earnings activity around the negotiation quarter, two standardized variables are calculated for each firm in "event time." The results are presented in Table 3, where $t=0$ denotes the quarterly earnings release preceding the end of the contract negotiation. The variables are calculated beginning seven quarters prior to and ending four quarters following the negotiation period. A three-year time span is employed, as most contracts examined were renegotiated every three years. In only four cases was a contract negotiated to cover an 18-month to two-year time period. For these observations, only those quarters between contracts are included in the calculations.

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[9] Quarterly accruals are not examined due to the lack of balance sheet data on the quarterly Compustat database.

Two standardized variables are reported. Computed for each contract, they then are weighted equally in averaging the results across observations in event time.[10]

$$(Q_t - E(Q_t))/SD_{FE} \qquad (3)$$

$$(Q_t - Q_{t-4})/SD_{lag} \qquad (4)$$

where

Q_t = earnings per share in quarter t, adjusted for changes in the common stock base;

$Q_t - E(Q_t)$ = unexpected earnings per share in quarter t using equation (1);

SD_{FE} = standard deviation of the forecast error, $Q_t - E(Q_t)$;

SD_{lag} = standard deviation of the seasonally differenced quarterly earnings per share $Q - Q_{t-4}$.

The first ratio is unexpected earnings from equation (1) deflated by the standard deviation of the forecast errors. The second ratio, based on equation (2), is the change in earnings from the fourth preceding quarter deflated by the standard deviation of that change in earnings. Time series of the standardized variables' cross-sectional means (equations 3 and 4) are computed and reported for both the contract and random samples. Also, the time series of cross-sectional mean *differences* between the contract and random samples are computed. Differences are computed for each matched pair (i.e., the contract sample firm's standardized variable less the corresponding random sample firm's standardized variable). All tests were replicated (not reported) using the reduced contract and matched samples.

As noted earlier, event time for the random and matched sample firms corresponds to the negotiation quarter of the corresponding contract firm. The first alphabetically arranged random firm is assigned the contract dates of the first alphabetically arranged contract firm, and so forth. A matched sample firm is assigned the contract dates of its corresponding contract firm.

Table 3 indicates that quarters 0 and −1 are not depressed relative to other quarters. Hypothesis tests are conducted on both the contract sample's time series of standardized variables (the first two columns of Table 3) and the differenced (contract less random sample) time series (last two columns of Table 3). Two empirical tests are conducted: (1) mean standardized unexpected earnings in quarters −1 and 0 are compared to mean standardized unexpected earnings in quarters −7 to −2, and (2) the mean standardized unexpected earnings in quarter zero is compared to the mean in quarter +1. Parametric two-tail t-tests and nonparametric Wilcoxon ranks tests are used to assess statistical significance.

The first test (i.e., the mean standardized unexpected earnings in quarters −1 and 0 compared to mean standardized unexpected earnings in quarters −7 to −2) does not result in any statistically

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[10] Alternative measures (not reported) also were calculated without changing any inferences. For example, quarterly earnings or seasonally differenced quarterly earnings were divided by either the firm's share price at the beginning of quarter t or the share price at the end of quarter t. These four variables control for the market's expectations of changes in cash flows. If managers depress reported earnings and not cash flows during contract talks, earnings will fall but share price will not change. These ratios bias the tests in favor of finding the hypothesized time-series pattern if wages unexpectedly rise following contract talks. In this case, unexpected cash flows and stock prices fall, causing the earnings-to-price ratio to rise during the talks. In spite of this bias, the calculated mean earnings-to-price ratios are inconsistent with managers depressing earnings during labor negotiations.

TABLE 3

AVERAGE STANDARDIZED QUARTERLY EARNINGS IN EVENT TIME. QUARTER ZERO IS THE EARNINGS RELEASED PRIOR TO THE END OF CONTRACT NEGOTIATION

	Contract Sample		*Random Sample*		*Differenced Ratios (Contract—Random)*	
Quarter	$(Q_t-E(Q_t))/SD_{FE}$	$(Q_t-Q_{t-4})/SD_{lag}$	$(Q_t-E(Q_t))/SD_{FE}$	$(Q_t-Q_{t-4})/SD_{lag}$	$(Q_t-E(Q_t))/SD_{FE}$	$(Q_t-Q_{t-4})/SD_{lag}$
-7	-.032	.056	-.028	.054	-.004	.002
-6	.310	.353	.006	.089	.304	.264
-5	.139	.242	.013	.111	.126	.131
-4	.003	.159	.051	.231	-.048	-.072
-3	.106	.180	-.062	.145	.168	.035
-2	-.074	.083	-.004	.217	-.070	-.134
-1	-.100	.001	.007	.159	-.107	-.158
0	.082	.138	-.062	.108	.144	.030
1	-.182**	-.069*	.060	.205	-.242**	-.274**
2	-.036	-.030	.035	.141	-.071	-.171
3	-.063	.006	-.108	.109	.045	-.103
4	-.031	-.008	-.053	.112	.022	-.120

* Significantly different from quarter zero at .10 level using two-tail t-test.

** Significantly different from quarter zero at .05 level using two-tail t-test and Wilcoxon two-tail ranks tests.

Q_t = earnings per share in quarter t,
$E(Q_t)$ = expected quarterly earnings from the autoregressive time-series model,
SD_{FE} = standard deviation of the forecast errors from the autoregressive time-series model, and
SD_{lag} = standard deviation of $Q_t - Q_{t-4}$.

significant differences using either the t-test or Wilcoxon test. Under the second test, both standardized variables' means in quarter zero are statistically larger than the corresponding means in quarter +1 at the .10 level (two-tail t-test) in the contract sample (first two columns of Table 3) and when contract and random samples are differenced (last two columns). However, the decline in the standardized variables from quarter 0 to quarter +1 is opposite the hypothesized change (i.e., managers are predicted to increase earnings following contract talks). Wages rising and accounting earnings falling following contract signing would induce the observed time-series pattern. All the preceding tests were repeated using the matched control sample in place of the random sample and no test statistic achieved statistical significance. These findings are inconsistent with the hypothesis that managers depress earnings before wage settlements.[11]

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[11] The reported standardized earnings' means in Table 3 are higher in quarter zero than the two quarters preceding contract talks and in the quarter following contract signing. Real production effects that mask any accounting manipulations might explain this time-series pattern. For example, during labor talks, production might be raised in anticipation of labor strikes. Higher production levels cause unit costs to fall and total profits to rise under absorption costing. If production is cut after contract signing, unit costs rise and total profits fall.

To test for real changes in production levels surrounding labor talks, quarterly inventory data were collected. Forty-eight of the 121 sample contracts for industrial firms reported quarterly inventory levels in *Moody's Industrial Manual*. Two ratios were calculated: inventory in quarter t divided by quarter $t-1$ sales and the change in inventory from quarter $t-1$ to t divided by quarter $t-1$ sales. The ratios were calculated for t ranging from quarter -7 to $+4$. There is no evidence indicating that inventory levels rise during or preceding contract talks. These findings are consistent with those

TABLE 4

SUMMARY STATISTICS FROM ESTIMATING THE AUTOREGRESSIVE MODEL OVER 1974–1981 FOR 85 CONTRACT FIRMS AND 85 RANDOM SAMPLE FIRMS. NEGOTIATION QUARTERS ARE EXCLUDED FROM THE ESTIMATION.

$$Q_{it} - Q_{it-4} = a_i + b_i(Q_{it-1} - Q_{it-5}) + \epsilon_{it}$$

Contract Sample (N=85)

				Residual Autocorrelation Coefficients				
	Intercept	*Slope*	R^{2a}	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 4*	*Lag 5*
Mean	-.011	.357	.183	.039*	.006	-.026	-.271*	-.021
Median	.009	.375	.120	.006	-.005	-.019	-.295	-.023
Std. Dev.	.146	.278	.196	.118	.140	.154	.188	.155
% Negative	43.5%	10.5%	—	44.7%	52.9%	57.6%	90.6%	56.5%

Random Sample (*N*=85)

				Residual Autocorrelation Coefficients				
	Intercept	*Slope*	R^2	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 4*	*Lag 5*
Mean	.031	.317	.154	.011	.026	-.020	-.195*	.000
Median	.017	.312	.087	.002	.009	-.013	-.174	-.004
Std. Dev.	.100	.282	.170	.102	.157	.155	.188	.163
% Negative	25.8%	10.6%	—	47.0%	44.7%	52.9%	85.9%	51.8%

Results of two-tail t-tests of differences of means for contract and random samples:

	t-statistic	*Significance*
Intercept	-2.226	.027
Slope	.921	.358

* Significantly different from zero at 1% level (two-tail *t*-test).
[a] Unadjusted R^2.

Results of Estimating the Quarterly Time-Series Model. Summary statistics of the autoregressive model estimations for the contract and random samples are presented in Table 4. Included are the average estimated coefficients, unadjusted R^2 figures, and residual autocorrelation coefficients.

A relatively large proportion (43.5 percent) of contract sample firms has a negative estimated intercept. In comparison, 25.8 percent of the random sample firms have negative intercepts. The estimated mean intercepts of the two samples differ significantly, as indicated by the two-tail *t*-tests of the differences of means. The mean slope coefficient in the contract sample, while not statistically significantly larger than in the random sample, indicates that seasonally differenced

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reported by Tracy [1985]. He finds that changes in inventory to sales are unrelated to strike activity around contract talks.

The preceding tests do not control for the higher wage bills after contract signing.

earnings are more highly serially correlated in the contract sample than in the random sample. This higher correlation likely is due to the contract sample being composed of larger firms, whose year to year fluctuations are typically less pronounced than the fluctuations in the random sample's smaller firms. On average, the contract sample firms have slightly higher unadjusted R^2's than the random sample firms. Both samples have relatively large fourth-order residual autocorrelation. This residual autocorrelation is not captured by the simple autoregressive model. A second regressor, $(Q_{t-4}-Q_{t-8})$, was added to the regression to include the dependence (results not reported). This reduced the contract sample's mean fourth-order autocorrelation to $-.079$, while that of the random sample was lowered to $-.049$. These autocorrelations still differ significantly from zero but are substantially smaller than those calculated without the additional regressor. Other parameters in Table 4 were not materially altered by the addition of the second regressor, except the mean and median unadjusted R^2 rose to approximately .40 for both samples. All the tests were replicated using the multiple regression with $(Q_{t-4}-Q_{t-8})$, and none of the study's inferences are changed.

Summary statistics in Table 4 were recomputed using the 62 contract firms and their matched counterparts (not reported). The mean intercepts of the matched and reduced contract samples are no longer statistically different. The contract sample mean and median intercepts ($-.007$ and .012) are slightly higher than those reported in Table 4 and the matched sample mean and median intercepts ($-.001$ and .015) are slightly lower than the random sample's mean and median.

The smaller intercepts of the contract firms relative to those of the random sample indicate that these firms had smaller drift in seasonally differenced quarterly earnings than the randomly selected firms over the time period of 1974–81.[12] The contract sample's smaller drift is consistent with the contract firms exhibiting poor operating performance relative to that of the random sample.[13] This possibility is examined next.

If the contract firms incurred real cash flow declines over the period 1973–1982, and if these declines were not fully anticipated by the market, then stock returns of the contract firms should exhibit negative abnormal performance and the random sample should not. Monthly equity rates of returns are obtained from the CRSP file for the period 6/69–12/81. For each sample firm i, abnormal performance in month t is calculated using the simple market model estimated over the 60 months preceding month t. Then the one-period forward prediction error, PE_{it}, is calculated using the estimated market model coefficients:

$$PE_{it}=R_{it}-(\hat{\alpha}_{it}+\hat{\beta}_{it}R_{mt})$$

R_{it}=continuously compounded (log transform) rate of return of firm i in month t;

R_{mt}=continuously compounded (log transform) equally-weighted market index in month t;

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[12] The sign of the drift of seasonally differenced earnings depends on the sign of the intercept if the process is stationary. See Pindyck and Rubinfeld [1981, p. 520].

[13] Poor operating performance and the smaller intercepts in the quarterly earnings time-series models might be due to managers in the unionized firms using different accounting procedures than managers in randomly selected firms. No differences were found between the accounting method choices of the two samples. Examined choices included depreciation, inventory, investment tax credits, and amortization of past service costs.

TABLE 5

CUMULATIVE ABNORMAL RETURNS (CAR) FROM MARKET MODEL REGRESSIONS 7/74–12/81
EQUALLY WEIGHTED MARKET INDEX
CONTRACT, RANDOM, AND MATCHED SAMPLES
(Z-STATISTICS IN PARENTHESES)

		Contract Less Random Sample (85 firms)			*Contract Less Matched Sample (62 firms)*		
Time Period	*No. of Months*	*Contract*	*Random*	*Difference*	*Contract*	*Matched*	*Difference*
A. 7/74–12/81	90	–.233 * (–1.530)	.009 (.060)	–.242 (–1.220)	–.119 (–.890)	–.099 (–.730)	–.020 (–.130)
B. 7/74–12/76	30	.000 (.000)	–.007 (–.070)	.007 (.060)	.066 (.760)	.036 (.400)	.030 (.260)
C. 1/77–6/79	30	–.226 ** (–2.760)	–.006 (–.120)	–.220 ** (–1.990)	–.185 ** (–3.050)	–.131 ** (–2.050)	–.054 (–.870)
D. 7/79–12/81	30	–.008 (–.080)	.022 (.290)	–.030 (–.250)	–.008 (–.080)	–.004 (–.050)	.004 (.040)

* Statistically significant at the .10 level (one-tail t-test)
** Statistically significant at the .05 level (one-tail t-test)

$\hat{\alpha}_{it}, \hat{\beta}_{it}$ = coefficients from estimating the market model over t-61 to t-1.

The estimated coefficients ($\hat{\alpha}_{it}$ and $\hat{\beta}_{it}$) are updated for each month t by reestimating the market model using the most recent 60 observations. The average monthly portfolio abnormal rate of return, PE_{pt}, where p is the contract or random sample, is generated by equally weighting the monthly prediction errors of the sample p firms. The monthly prediction errors are then summed to derive cumulative abnormal returns (CAR) for each sample over the period 7/74 to 12/81.

Table 5 reports cumulative abnormal returns for the contract, random, and matched samples over the entire period of 7/74 to 12/81 (Row A) and the three equal subperiods comprising the entire period (Rows B, C, and D). The first three columns of Table 5 compare the entire contract sample to the random sample. The last three columns of Table 5 compare the reduced contract sample to the matched control sample. Matching by industry and size decreases the contract sample from 85 firms to 62 firms. Over the entire period (row A), the contract sample experiences a statistically insignificant relative decline of 24.2 percent compared to the random sample and a two percent relative decline compared to the matched sample.[14] Only for the subperiod 1/77 to 6/79 are cumulative abnormal returns of the contract sample relative to those of the random sample statistically different from zero. During this same subperiod, the reduced contract and matched samples have sta-

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[14] Under the assumption that the monthly average prediction errors are independent and identically distributed, a Z-statistic is calculated to assess significance. The Z-statistic is computed as:

$$Z = \frac{\frac{1}{n}\sum_{t=1}^{n} PE_{pt}}{(\sigma^2(PE_{pt})/n)^{1/2}}$$

where n is the number of months in the cumulation and $\sigma^2(PE_{pt})$ is the variance of the calculated portfolio prediction errors across time.

tistically significant negative CAR's of 18.5 percent and 13.1 percent, respectively. However, the paired difference (contract less matched) is not different from zero.

The findings in Table 5 are consistent with the contract firms experiencing unanticipated cash flow declines over at least a portion of the sample period. These reduced cash flows were not restricted to unionized firms but extended to similarly sized firms in the same industry.

The contract firms reported a negative mean earnings to total assets ratio in 1978 (Table 2) while the random firms reported a positive mean accounting rate of return. The matched sample firms also had a positive mean accounting rate of return in 1978 (not presented). These results are consistent with a study by Clark [1984] who finds that the presence of unions reduces accounting rates of return after controlling for firm, industry, and market differences.

Sensitivity Analysis. Additional tests were conducted to ascertain the sensitivity of the results to various assumptions. These are described briefly below.

(a) The preceding tests assume that the last quarterly earnings announced before the new contract begins is the one likely to be depressed. However, in some contract talks, quarters −1, −2, or −3 might be reduced. To test this possibility, for each contract and the two standardized measures, the quarter with the smallest earnings measure over quarters −7 through +4 is identified. Then, for each quarter *i*, the frequency across contracts of the smallest measure is constructed. A Kolmogorov-Smirnov test using the random sample's distribution of frequencies as the expected distribution fails to reject the null hypothesis of no difference between the random and contract samples.[15]

(b) The net benefits of earnings manipulations might be less in times of financial distress than at other times. Managers' incentives to reduce earnings decline if the likelihood of bond covenant default is higher. Likewise, unions might have better alternative sources of information regarding firm performance during financial downturns (e.g., layoffs and plant closings) than during other times. To test this possibility, the contract sample is split based on the sign of the time-series model intercept. Tests conducted in Table 3 on the standardized variables are repeated first for firms with negative time-series model intercepts and then for firms with positive intercepts. Under the hypothesis being tested, the positive intercept subsample should exhibit earnings manipulations more frequently in quarter zero than firms with negative intercepts. The evidence (not reported) does not support this hypothesis.

Labor strikes also reduce the power of the tests if strikes increase earnings fluctuations or if strikes affect managers' incentives to manipulate earnings. The evidence (not reported) does not support this conjecture. The *WSJI* was examined for evidence of strike activity surrounding contract talks. The contract sample is split according to whether a strike did or did not occur in the three months preceding the new contract's approval. The 85 contract talks (63 percent of the sample) not involving strikes have statistically insignificantly greater earnings in quarter 0 than quarter +1 under both standardized measures.

Finally, since layoffs are easily observed by unions, earnings manipulations are likely to have less impact on negotiations when firm employment is declining. The contract sample is split on the negative or non-negative firm-wide employment change in the year of contract talks from the preceding year. Neither subsample (i.e., decreased and not decreased employment) evidences depressed earnings during labor talks.

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[15] A chi-squared test which assumes that the expected frequency of the lowest earnings measure is equal across quarters also is calculated for the two standardized measures. The null hypothesis of no difference between the actual and expected frequencies is not rejected.

(c) Each preceding test uses average results across all observations. It is possible that managers systematically reduce only the large positive unexpected earnings, the effect of which is diluted in the means. One possibility is that managers are more likely to decrease earnings when forecast errors (i.e., unexpected earnings) are positive. To test this hypothesis, the largest 20 percent of standardized forecast errors in negotiation quarters is compared to the largest 20 percent of forecast errors in non-negotiation quarters.

The means of the largest 20 percent of standardized unexpected earnings in negotiation quarters are not statistically significantly smaller than the means of the top 20 percent of forecast errors in all other quarters. These findings reject the hypothesis of earnings manipulations when large positive unexpected earnings are realized in negotiation quarters.

(d) We further hypothesize that the motivation to manipulate earnings is greater if the employer is the first company in the industry to negotiate a new (three-year) contract with a specific union. Using the companies reported in the *Wage Calendar*, the test statistics in Table 3 are recomputed for contracts in which the company was the first in its industry (as defined by two-digit SIC code) to have contract talks. It is concluded that the timing of contract negotiation within the industry does not alter the previous findings.

(e) Finally, if the negotiation quarter (i.e., quarter zero) was the fourth quarter, it is deleted and the analysis is performed using the remaining data. This test eliminates two potentially confounding effects: (1) the presence of an annual audit, which reduces management's discretion over fourth-quarter results, and (2) the effect of management compensation plans. Managers are less likely to reduce reported earnings in the fourth quarter, because the bonus pool, and hence, management compensation, is reduced.[16] If negotiation period earnings occur prior to the fourth fiscal quarter and they are depressed, the compensation pool is unaffected to the extent earnings following $t=0$ are raised. Deleting all fourth-quarter negotiation quarters does not alter the previous findings.

Tests of Annual Data

Like the quarterly findings, tests of annual earnings reject the hypothesis that managers depress earnings during labor talks. In particular, the following analyses were conducted:

Alternative Earnings Measures. The annual sample of contract firms is examined using a random walk model for expected earnings, as described earlier. We use three alternative measures of earnings: (1) adjusted earnings per share, (2) net income after extraordinary items, and (3) income available to common stockholders. In addition, three alternative definitions for changes in annual accounting accruals are used: total accruals, the change in receivables, and the change in inventories. Use of these measures is unable to reject the null hypothesis of no depressed earnings during union contract talks.

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[16] This statement assumes that annual earnings are between the lower and upper bounds that constrain the size of the bonus pool. See Healy [1985].

Alternative Timing Conventions. As noted earlier, all firms in the annual sample report on a calendar-year basis. In all annual analyses, when contracts are negotiated within seven months of a calendar year's close, the "negotiation period" chosen as year zero is the most recently completed fiscal year (e.g., all contract negotiations completed from January 1976 through July 1976 defined 1975 earnings as the negotiation period earnings). To test the sensitivity to this July timing convention, May, June, and August conventions also are used. Also, the sample of firms is restricted further in one test to only those contracts signed between May and July. These contract talks are the most likely to have been exposed to last year's earnings and, hence, the test should have the most power. Again, there is no evidence that managers depress earnings during contract talks.

Alternative Test Statistics. Test statistics are calculated defining year 0 as the negotiation period and years -1 and $+1$ as the non-negotiation periods. Two-by-two contingency tables of the frequencies of positive/negative unexpected earnings (or accruals) in the negotiation and non-negotiation periods are constructed. Then, chi-squared statistics are computed. Negotiation periods will show larger frequencies of negative unexpected earnings than non-negotiation periods if managers depress earnings during contract talks. Chi-squared statistics fail to reject the hypothesis that managers reduce earnings during labor talks. Also, the mean standardized unexpected earnings (or accruals) in the negotiation year and the subsequent year are calculated and found to be insignificantly different. In no case is the proportion of negative unexpected earnings in the negotiation period significantly greater than in the following year. In most cases, the proportion of negative forecast earnings is greater in the year after the negotiation period. The proportion of the annual sample with declines in accruals also is calculated for the two periods, with no change in the results.

INTERPRETATIONS AND SUMMARY

The tests reported in this paper are inconsistent with the hypothesis that managers reduce earnings reported during labor contract negotiations. Three (non-mutually exclusive) interpretations of the findings exist. First, as the firms were experiencing poor real operating performance, managers did not adjust earnings during the sample period. Second, no manipulations occurred, as unions can undo them. Third, the tests lack sufficient power to detect management's earnings adjustments. These explanations are discussed below.

(1) During the sample period (roughly 1969–1981), the unionized firms performed poorly and, hence, managers in these firms had little incentive to depress reported earnings during contract talks. Three pieces of evidence suggest that the unionized firms had financial difficulties during the test period. First, negative accounting rates of return and smaller growth rates for the contract sample compared to the random sample are reported in Table 2. Second, average negative drift in seasonally differenced earnings among contract firms is reported in Table 4. And third, Table 5 shows that the unionized firms had negative abnormal stock returns during the sample period. A matched sample of similarly sized firms from related industries also performed poorly over the sample period, providing some evidence that the contract sample's poor performance should not be attributed entirely

to unionization. However, the contract sample had statistically significantly smaller growth in sales and market value during 1974 to 1981 than its matched counterparts, indicating some real costs of unionization.

Under this interpretation of the findings, the costs to managers of further depressing accounting earnings during contract talks likely exceed the benefits. This suggests that managers of these unionized firms possibly depressed earnings during contract talks when their firms were profitable, but such earnings manipulations were abandoned when the firms were less profitable.

(2) The unions can undo managers' accounting manipulations. Managers engage in (costly) earnings manipulations if the unions are unable to adjust completely the reported numbers. However, union officials have incentives to undo managers' accounting manipulations if such manipulations affect labor negotiations. Reynolds [1978, p. 390] claims that, with so much at stake, union officials are financially sophisticated and able to accurately assess the firm's and industry's financial position independently of management's disclosures. If the unions are able to undo managers' manipulations, there is no reason for managers to engage in this costly exercise.

The tests performed in this paper rely on publicly available data (i.e., past earnings). Labor officials can undo managers' adjustments to the same extent that our tests can detect such manipulations unless, because of large sample sizes, our tests are more powerful than the unions' ability to adjust the numbers. The implicit assumption in this and other papers is that the tests are sufficiently powerful to detect manipulations given that they occur, while non-managers (voters, politicians, unions, or boards of directors) are unable to completely adjust for such manipulations.

(3) Managers manipulate reported earnings to affect labor negotiations but the tests lack sufficient power to detect such manipulations. Several reasons can explain the low power of the tests. First, the normal variability in quarterly or annual earnings is large relative to the amount of earnings manipulation during labor talks. While our tests are based on at most 242 observations, this might not be large enough to reduce standard errors.

Second, the tests lack power because it is difficult to specify which quarterly or annual figure is subject to manipulation. Although different timing assumptions are used, it is unlikely that any given assumption applies to all observations. In contrast, Healy [1985] can identify which annual earnings number is subject to manipulation since the compensation contract specifies how the bonus pool is related to reported earnings.

Finally, the tests lack power because they do not control for the effect of union contract talks on the firm's cash flows. For example, higher wages following the contract reduce earnings, thereby masking any managerial accounting manipulations and reducing the power of the tests.

Contracts that explicitly use accounting numbers have been found to affect managers' accounting choices. Presumably, implicit uses of accounting numbers also can affect accounting decisions. It was expected that labor contract talks, while not explicitly based on accounting numbers, would implicitly use those numbers in the negotiation process, thereby creating incentives for managers to manipulate earnings. Labor contract talks are like the political process in their implicit use of accounting numbers, but are unlike the political process in that only earnings released during contract talks are subject to manipulation. In our sample of firms, there is no evidence that the benefits of adjusting earnings (i.e., the anticipated wage savings) exceed the cost (i.e., reduced management compensation and/or technical default costs on debt covenants). Alternatively, the benefits might exceed the costs, but the earnings adjustments, being too small relative to the normal variance of earnings, are difficult to detect.

Three related papers also examine managers' incentives to manipulate earnings. Healy [1985] analyzes the role of accounting numbers in executive compensation contracts. DeAngelo [1986a and 1986b] analyzes the time-series behavior of accounting numbers surrounding (a) proxy contests and (b) negotiated management buyouts in "going private" transactions. Healy hypothesizes that managers can increase their bonuses by manipulating accounting accruals. In DeAngelo [1986a], managers are hypothesized to raise reported earnings before the resolution of proxy contests to increase their likelihood of winning the election. DeAngelo [1986b] hypothesizes that managers can decrease the price they pay outside shareholders when they take the firm private by lowering reported income prior to the "going private" transaction. Like the present study, these three papers assume that costly information prevents non-managers (e.g., unions, boards of directors, stockholders, and their financial advisors) from fully adjusting the reported numbers for any managerial opportunism.

Healy [1985] and DeAngelo [1986a] find evidence of managerial manipulation of earnings surrounding bonus determination and proxy contests, whereas DeAngelo [1986b] and the present study are unable to document any managerial opportunism. Assuming that the tests have sufficient power to detect manipulation and that such manipulation benefits managers because the outside parties are unable to make offsetting adjustments, the four studies' conflicting results suggest that (a) managers' perceived benefits of earnings manipulation differ across contracts and situations and/or (b) non-managers have either different information costs or different incentives to acquire information. These four studies and subsequent ones will help delineate the nature and magnitude of managers' perceived benefits of earnings adjustments and non-managers' information costs and their incentives for information acquisition.

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NOTES

Evidence on the Relationships Between Earnings and Various Measures of Cash Flow

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ABSTRACT: In recent years, there has been renewed interest in cash flows. This paper describes empirical relationships between signals provided by accrual earnings and various measures of "cash flow" (CF). We include among definitions of CF both "traditional" measures that include simple adjustments to earnings data (i.e., net income plus depreciation and amortization, and working capital from operations) as well as "alternative" measures that incorporate more extensive adjustments (defined in the paper). Evidence is presented on three issues. First, the correlations among various measures of CF are examined to determine whether the signal provided by a given CF measure differs from the signal provided by others. Second, various measures of CF are correlated with earnings to lend evidence on whether the CF and earnings signals are similar. Third, we provide evidence on the ability of earnings and cash flow measures to forecast one period and two period ahead cash flows and, in so doing, we examine the FASB's assertions that earnings are superior to CF in predicting future CF. Results can be summarized as follows. First, the observed correlations between traditional cash flow measures and alternative CF measures that incorporate more extensive adjustments are low. Second, the correlations between alternative measures of CF and earnings are low while the correlations between traditional measures of CF and earnings are high. These first two results are consistent with earnings and alternative measures of CF that incorporate more extensive adjustments conveying different signals. Finally, for four out of five cash flow variables, the results are consistent with the hypothesis that random walk models predict CF as well as (and often better than) models based on other flow variables. An exception to this general result is that net income plus depreciation and amortization and working capital from operations appear to be the best predictors of cash flow from operations. Overall, these results are not consistent with the FASB's statements that earnings numbers provide better forecasts of future cash flows than do cash flow numbers.

INTRODUCTION

In discussions in the financial press and in research papers, the definition of "cash flow" is often some minor variant of net income plus depreciation and amortization (*NIDPR*).[1] In recent years, however, alternative cash flow measures have been advocated by accounting practitioners, the business media, and academics (e.g., Robert

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Morris Associates [1982], Greene [1981], Largay and Stickney [1980], Gombola and Ketz [1983], and Drtina and Largay [1985]).

Accounting research is generally concerned with the relationship between accounting signals and user decisions. In this paper, we are specifically concerned with the relationships between earnings and various CF measures, focusing on the differences among various definitions of CF. Three specific questions are addressed:

Q1. Are the traditional CF measures used in previous research highly correlated with alternative measures of cash flow that have recently been advocated by academics and practitioners?

Q2. Are accrual accounting earnings and cash flow measures highly correlated?

Q3. Does earnings or a CF variable best predict future cash flows?

Each of these interrelated questions is relevant for studies that examine the role of CF data in user decision models. By examining the properties of various accounting variables, we attempt to assess the potential importance of an additional accounting input (CF) to user decision models without defining the specific decision context.[2] This is an approach similar to that taken by Dharan [1984] in examining the potential information content of oil and gas reserve value disclosures. Examples of other studies in the accounting literature which examine the properties of accounting numbers without defining a specific decision context are found in: (1) Foster [1986]; (2) the Ball and Foster [1982, pp. 202–203] discussion of studies which examine how reported accounting numbers are affected by the use of alternative methods available under GAAP; and (3) the Gonedes and Dopuch [1974] review of studies which attempt to assess the importance (materiality) of an accounting change by examining the relative magnitude of the change on the other accounting numbers.

A Test of Earnings Versus Cash Flows as Predictors of Future Cash Flows

The Financial Accounting Standards Board (FASB) states in *Objectives of Financial Reporting by Business Enterprises* [1978] that the primary objective of accounting data is to:

> provide information to help present and potential investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise (paragraph 37).

However, the FASB contends that financial reporting should focus on earnings as opposed to CF data because earnings are argued to be superior to CF data as a predictor of future CF:[3]

> Information about enterprise earnings based on accrual accounting generally

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[1] Altman, Haldeman, and Narayanan [1977] and Chen and Shirmerda [1981] survey five studies in which CF is defined as net income plus depreciation and amortization. Other examples include Strischek [1980], Fulmer et al. [1984], and Standard and Poor's [1982].

[2] CF data are potentially useful in any decision context in which accrual data are commonly used including: a) predicting financial distress; b) assessing the risk, size, and timing of loan decisions; c) predicting credit ratings; d) "valuing" closely held companies; and e) providing incremental information in securities markets.

[3] Similar assertions of the superiority of earnings data are found in FASB [1976], SEC ASR No. 142 [1973], and FASB [1981].

> provides a better indication of an enterprise's present and continuing ability to generate favorable cash flows than information limited to the financial aspects of cash receipts and payments (p. ix).

Furthermore, the FASB [1979] maintains that decision makers form estimates of future CF by using earnings numbers rather than CF data:

> The relationship may be identified in a two-stage process for the assessment of future cash flows: a) Reports of past earnings are used for the assessment of future earnings. b) An adjustment is then made to the assessment of future earnings to derive an assessment of future cash flows (paragraph 8).

The FASB asserts that historical earnings are clearly superior to historical CF in predicting future CF. We present a test of the hypothesis:

Null Hypothesis: Earnings and cash flow data are equally effective as predictors of future cash flows.

Alternative Hypothesis: Earnings outperform cash flow data as predictors of future cash flows.

Our test of the FASB's assertion relies on two assimptions: (1) (at least) one of the measures of CF examined herein is a measure of interest to decision makers, and (2) one- and two-year-ahead forecasts of CF from simple prediction models provide an adequate basis for comparing the relative predictive ability of earnings and CF data.

The remainder of the paper is organized as follows. The cash flow variables are defined in the next section. In the following two sections, data on the contemporaneous correlations between earnings and the cash flow variables, and preliminary evidence on the ability of cash flow and earnings to predict future cash flows, is presented. The paper closes with a summary.

DEFINITION OF CASH FLOW AND EARNINGS VARIABLES

We define five measures of cash flow. The first two CF measures involve relatively few adjustments to reported accrual earnings. These are the traditional measures commonly discussed in the financial press and used in most earlier research on "cash flows."

The first traditional CF measure, *NIDPR*, results from adding back depreciation and amortization to net income and is defined as:[4]

$$NIDPR = NIBEI + DPR$$

where

$NIBEI$ = Net income before extraordinary items and discontinued operations (Compustat Item No. 18), and

DPR = Depreciation and amortization charges (Item No. 14).

A second traditional measure of cash flow, *WCFO*, is the result of further adjustments to earnings to remove the effects of gains and losses on asset sales, gains and losses on investments accounted for by the equity method, amortization of bond premiums or discounts, and deferred taxes, i.e.,

$WCFO = NIDPR$ + adjustments for 'other' elements of $NIBEI$ not affecting working capital,

where $WCFO$ = Item No. 110

Following Largay and Stickney [1980] and Gombola and Ketz [1983] we define a third CF measure, *CFO*, using changes in non-cash current assets and current liabilities (other than cash,[5] notes payable, and the current portion of long-term debt), obtained from changes in individual accounts on the Compustat files:[6]

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[4] Each variable discussed in this section implicitly has a firm/time subscript which has been omitted to simplify the notation.

$$\begin{aligned} CFO &= WCFO - \Delta \text{non-cash current assets from operations} + \Delta \text{current liabilities from operations} \\ &= WCFO - \Delta REC - \Delta INV - \Delta OCA + \Delta AP + \Delta TP + \Delta OCL \end{aligned}$$

where

ΔREC = change in accounts receivable during the period (Item No. 2),

ΔINV = change in inventories during the period (Item No. 3),

ΔOCA = change in other current assets during the period (Item No. 68),

ΔAP = change in accounts payable during the period (Item No. 70),

ΔTP = change in taxes payable during the period (Item No. 71), and

ΔOCL = change in other current liabilities during the period (Item No. 72).

These adjustments to *WCFO* can be viewed as conversions of amounts included in earnings to approximate the corresponding cash basis amount (e.g., subtracting the change in receivables can be viewed as conversion of revenues to approximate the cash collected from customers).[7]

We next adjust *CFO* for the period's investment activities to arrive at cash flow after investment but before financing (*CFAI*), which is an important component in many firm valuation models and is emphasized in lending and bond rating decisions:

$$CFAI = CFO + PSPPE + PSI + \Delta PPE + \Delta INVMT$$

where

$PSPPE$ = proceeds from the sale of property, plant, and equipment (Item No. 107),

PSI = proceeds from sale of investments (Item No. 109),

ΔPPE = amount of capital expenditures during the period (Item No. 128), and

$\Delta INVMT$ = increase in investments in other corporations during the period (Item No. 129).

To complete the continuum and because the change in cash (*CC*) may contain less measurement error than other measures, we include it as a fifth CF measure:

$$\begin{aligned} CC &= CFAI + \text{net financing activity for the period} \\ &= \text{change in cash and short-term marketable securities during the period (Item No. 1).} \end{aligned}$$

SAMPLE SELECTION AND RESULTS—QUESTIONS 1 AND 2

This section discusses the sample selection criteria and presents the results of tests of contemporaneous correlation between: (1) the various cash flow measures, and (2) cash flow measures and earnings.

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[5] We define cash to include short-term marketable securities.

[6] Like Largay and Stickney [1980] and Robert Morris Associates [1982], but unlike Gombola and Ketz [1983], our definition excludes changes in notes payable and the current portion of long-term debt under the premise that these relate more to financing activities than to operations. Also, as in all previous studies, because of data limitations, we make no attempt to adjust for changes in noncurrent accounts related to operations such as long-term receivables.

[7] A line by line cash basis equivalent to the income statement would require more data than is available from Compustat or in corporate financial statements. For example, a detailed conversion of revenues to cash collected from customers must adjust for items such as progress payments and other advances from customers in addition to the changes in current and long-term accounts receivable.

There are strong time-related trends in each CF series. Consequently, high correlations in the levels of any two variables would not necessarily indicate that the variables provide the same signal. Therefore, first differences and percentage changes are analyzed.[8]

Sample Selection

Data needed for the cash flow conversions are available only after the funds statement became mandatory in 1971. Since a time series of the variables was required for the analysis, only firms with complete data on all required items for the period 1971–1981 were retained in the sample. There were 1,289 firms on Compustat that met this requirement. To ensure that the process of conversion to cash flow is consistent across firms and across time, we retained only firms that used the working capital format every year. To check this, the net change in working capital, computed using data on current assets and current liabilities, was compared to the difference between total sources and total uses of funds. Firms were retained in the sample only if these alternative measures of net change in working capital were substantially equal. This check eliminated 965 firms, leaving a final sample of 324 firms.[9] Although the sample selection requirements eliminated a large fraction of the population, it is not clear that sample firms should systematically differ from other firms in the population. Moreover, we have a high degree of confidence in the comparability of the data for all the firms in the final sample.

Correlations between Alternative Measures of Cash Flow

The first question addressed is whether the traditional measures of CF, *NIDPR* and *WCFO*, appear to be "good proxies" for alternative CF measures *CFO* and *CFAI*. Table 1 contains summary information on the squared correlation coefficients (R^2) for all pairwise comparisons between *CFO*(*CFAI*) and either *NIDPR* or *WCFO* for each form of the data series (first differences and percentage changes)[10] for each of the 324 firms.[11] Because 11 years of data are available for sample firms, each time series has ten observations per firm after differencing. The summary information in Table 1 includes the distribution of the time series correlations across firms by quintile, along with the median and mean.

The median and mean squared correlations of *CFO*(*CFAI*) with the more traditional CF measures (*NIDPR* and *WCFO*) are low for both the first difference and percentage change series. Although between 17 and 27 percent of the 324 correlations are statistically significant at the .05 level, even these cor-

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[8] Correlations in levels of the earnings and cash flow series were also calculated. Complete data on these correlations are available from the authors.

[9] We considered expanding our sample by approximating *WCFO* by adjusting net income for items not affecting working capital (i.e., depreciation, amortization, equity in earnings of unconsolidated subsidiaries, and deferred taxes). We decided not to pursue this possibility further when we found that, for those firms for which we had complete data, this approximation seems to introduce relatively large errors. Specifically, we found that the average absolute difference between approximated *WCFO* and reported *WCFO* exceeded five (ten) percent of reported *WCFO* for 16.9 (6.7) percent of the firms for which we had complete data.

[10] The percentage change series is defined as the first difference in the series deflated by last year's value of the series.

[11] In Table 1, we also report correlations between the change in cash (*CC*) and the other CF variables for completeness. However, these correlations are not discussed in the text.

TABLE 1

DISTRIBUTION OF CORRELATIONS (R^2) BETWEEN EARNINGS AND CASH FLOWS ACROSS SAMPLE FIRMS

*Variables in Correlation**	*No. of Insig. R^2***	*Quintiles* 20%	40%	60%	80%	*Median*	*Mean*
PANEL A: FIRST DIFFERENCES							
Question 1:							
(CFO,NIDPR)	238	.024	.118	.211	.402	.158	.222
(CFO,WCFO)	230	.029	.125	.229	.444	.175	.244
(CFAI,NIDPR)	260	.013	.066	.167	.323	.108	.179
(CFAI,WCFO)	255	.014	.070	.171	.358	.121	.195
(CC,NIDPR)	271	.014	.047	.127	.281	.079	.155
(CC,WCFO)	262	.013	.045	.114	.319	.078	.163
(CFO,CFAI)	32	.510	.740	.867	.947	.823	.722
(CFO,CC)	145	.095	.296	.483	.733	.367	.411
(CFAI,CC)	134	.080	.316	.543	.788	.433	.447
Question 2:							
(NIDPR,NIBEI)	1	.924	.966	.986	.994	.980	.940
(WCFO,NIBEI)	30	.554	.778	.901	.964	.805	.754
(CFO,NIBEI)	241	.026	.103	.227	.392	.158	.223
(CFAI,NIBEI)	263	.015	.073	.176	.316	.109	.184
(CC,NIBEI)	270	.013	.050	.130	.278	.086	.156
PANEL B: PERCENTAGE CHANGES							
Question 1:							
(CFO,NIDPR)	266	.008	.045	.127	.295	.074	.165
(CFO,WCFO)	259	.008	.039	.130	.332	.071	.168
(CFAI,NIDPR)	282	.009	.042	.105	.235	.064	.137
(CFAI,WCFO)	289	.010	.037	.080	.207	.054	.126
(CC,NIDPR)	280	.010	.037	.101	.255	.062	.142
(CC,WCFO)	276	.006	.036	.100	.269	.058	.146
(CFO,CFAI)	191	.090	.182	.342	.573	.257	.329
(CFO,CC)	250	.010	.048	.157	.371	.091	.195
(CFAI,CC)	242	.014	.062	.158	.387	.096	.211
Question 2:							
(NIDPR,NIBEI)	32	.585	.846	.935	.974	.901	.781
(WCFO,NIBEI)	71	.298	.612	.808	.912	.709	.627
(CFO,NIBEI)	268	.007	.037	.119	.285	.070	.162
(CFAI,NIBEI)	281	.009	.032	.097	.244	.058	.138
(CC,NIBEI)	277	.008	.035	.089	.243	.056	.137

* NIBEI = net income before extraordinary items
NIDPR = net income plus depreciation and amortization
WCFO = working capital from operations
CFO = cash flow from operations
CFAI = cash flow after investment
CC = change in cash and short-term marketable securities

** Number of firms (out of 324) for which the correlation is not statistically significant at the .05 level. To be significant at the .05 level, R^2 must exceed .332.

relations are generally low.[12] Given the preponderance of relatively low (and insignificant) correlations, we conclude that, for many firms, more traditional measures of CF used in earlier research are poor proxies for alternative measures of CF incorporating additional adjustments.

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[12] The correlations between *CFO* and *CFAI* are frequently relatively high—especially in the first difference series. The correlations between *CFO* and *CC* and between *CFAI* and *CC*, while smaller, are often significant.

Contemporaneous Correlations Between Cash Flows and Earnings

To address the second question of how various cash flow measures correlate with contemporaneous earnings numbers, correlations between the five cash flow measures and *NIBEI* are presented in Table 1.

The correlations of *CFO, CFAI,* and *CC* with *NIBEI* are dramatically lower than the correlations of *NIDPR* and *WCFO* with *NIBEI.* Although we do not report formal tests of statistical significance, it is apparent from the quintile information in Table 1 that the correlations of the traditional CF measures with earnings are significantly greater than either the correlations of the traditional CF measures with alternative CF measures or the correlations of the alternative CF measures with earnings. This result is consistent with *NIDPR* and *WCFO* being similar to earnings for most firms while the alternative measures of CF are substantially different from earnings for most firms.

Implications for Prior Research

The correlations between earnings and the traditional CF measures used in most prior research are relatively high, while the correlations between earnings and the alternative cash flow measures are generally low. Taken together, these results suggest that the traditional CF measures used in previous research are relatively unlikely to provide users with different information from that contained in the earnings number. Indeed, this suggests a possible explanation for the lack of significant results for the CF variable examined in some prior research on failure prediction (e.g., Chen and Shirmerda [1981]), bond rating classification (e.g., Kaplan and Urwitz [1979]), and market price association (e.g., Patell and Kaplan [1977]). Further, the low level of contemporaneous correlations between the traditional CF measures and alternative measures of cash flow suggests that new research using other measures of CF might yield different results.[13]

PREDICTING EARNINGS AND CASH FLOWS —PRELIMINARY EVIDENCE ON QUESTION 3

The performance of alternative predictors of future CF is of interest for two reasons. First, it provides a basis for evaluating the FASB's assertions that accruals are superior to historical CF in predicting future CF. Second, it provides information about the behavior of simple, feasible models of CF expectations which might be useful in future research.

In evaluating the relative performance of alternative variables as predictors of future CF, we consider each of the five alternative measures of CF discussed earlier. Because (1) there is no theory to specify the form of a (possibly) multivariate CF prediction model, and (2) the data are insufficient to empirically determine the form of such a model, we can provide only preliminary evidence on this issue. Therefore, we consider only a limited set of single variable models. Further, we examine only simple linear forecasts based on one- or two-period lagged values of the predictor variable. Finally, we only use variables with *fewer* adjustments along the continuum from

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[13] Studies using alternative measures of CF to reexamine the incremental information content of CF in a stock market setting include: Bowen, Burgstahler, and Daley [1984], Rayburn [1985], and Wilson [1985]. Each of these studies provides evidence consistent with alternative CF measures possessing information content in addition to that contained in earnings.

TABLE 2

MEDIANS (AND AVERAGE RANKS)[1] OF ABSOLUTE FORECAST ERRORS SCALED BY THE ACTUAL VALUE OF THE FORECASTED SERIES

Dependent Variables	*Predictor Variables* *NIBEI*	*NIDPR*	*WCFO*	*CFO*	*CFAI*	*CC*
PANEL A: ONE PERIOD AHEAD FORECASTS						
NIBEI[2]	.252 (—)					
NIDPR	.454 (2.0)	.192 (1.0)				
WCFO	.475 (3.0)	.232 (2.0)	.200 (1.0)			
CFO	.587 (3.4)	.439 (1.6)	.434 (1.8)	.547 (3.2)		
CFAI	1.365 (1.9)	1.759 (3.6)	1.869 (4.6)	1.500 (3.3)	1.223 (1.6)	
CC	2.881 (2.7)	4.361 (4.9)	4.437 (6.0)	3.678 (4.1)	2.512 (2.3)	1.469 (1.0)
PANEL B: TWO PERIOD AHEAD FORECASTS						
NIBEI[2]	.377 (—)					
NIDPR	.537 (2.0)	.306 (1.0)				
WCFO	.552 (3.0)	.334 (2.0)	.302 (1.0)			
CFO	.600 (3.4)	.431 (1.5)	.425 (1.5)	.607 (3.6)		
CFAI	1.242 (1.7)	1.608 (3.6)	1.707 (4.7)	1.472 (3.2)	1.205 (1.9)	
CC	2.565 (2.7)	3.874 (4.9)	4.123 (5.9)	3.294 (4.2)	2.524 (2.3)	1.344 (1.0)

[1] Ranks based on the median forecast error across predictor variables in a given year are averaged across ten years in Panel A or nine years in Panel B.

[2] A random walk model for earnings is presented as a benchmark.

NIBEI to *CC* as predictor variables.[14] We consider simple prediction models of the form:[15]

$$\hat{Y}_{i,t+1} = X_{i,t} \qquad (1)$$

where

$\hat{Y}_{i,t+1}$ = the forecast of the CF variable for firm i in period $t+1$, and

$X_{i,t}$ = the value of the predictor variable for firm i in period t.

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[14] For example, forecasts of *CFO* are based on single variable models using lagged values of either *NIBEI, NIDPR, WCFO,* or *CFO* as the predictor variable—not *CFAI* or *CC*.

[15] Since we do not search for an optimal constraint, it is conceivable that some other constrained model might provide smaller prediction errors, e.g., the model $Y_{i,t+1} = .5X_{i,t}$ might provide better predictions. However, model (1) is at least as plausible as any other constrained model and has been found to perform well in other prediction settings.

We also analyzed a less constrained prediction model of the form: $Y_{i,t+1} = \alpha + \beta X_{i,t}$ where α and β were estimated from the preceding years. The results of this analy-

TABLE 3

FRIEDMAN TESTS* OF THE NULL HYPOTHESIS THAT, FOR EACH CASH FLOW VARIABLE, MEDIAN FORECAST ERRORS ARE EQUAL ACROSS ALL SINGLE PREDICTOR MODELS**

	One Period Ahead		*Two Period Ahead*	
CF Variable	*Chi-Sq.*	*p*(H_0)	*Chi-Sq.*	*p*(H_0)
NIDPR	10.00	<.01	9.00	<.01
WCFO	20.00	<.001	18.00	<.001
CFO	15.60	<.01	21.90	<.001
CFAI	24.72	<.001	22.13	<.001
CC	48.29	<.001	42.33	<.001

* Friedman's two-way analysis of variance by ranks [Siegel, 1956, p. 166].

** For example, for CFO, the null hypothesis is that median forecast errors are equal across single predictor models based on NIBEI, NIDPR, WCFO, or CFO. The hypothesis is rejected if *any* of the single predictor models is detectably better or worse.

Thus, when X and Y are the same variable, this model corresponds to a random walk. Previous evidence supports a random walk (sometimes with a drift term) as a prediction model for earnings variables. Our results should lend insight into the reasonableness of the random walk model for CF variables.

Forecasting CF

Median prediction errors are presented in Table 2 for each of the CF variables.[16] Panel A (B) provides the one (two)-period-ahead forecast errors. The results of random walk prediction models are summarized along the diagonal. A comparable random walk earnings forecast model (i.e., using this period's *NIBEI* to predict next period's *NIBEI*) is presented as a benchmark in the upper left cell of each panel in Table 2. The magnitudes of the median relative forecast errors for random walk predictions of *NIDPR* and *WCFO* are smaller than for *NIBEI* while the median relative forecast errors for random walk predictions of *CFO, CFAI*, and *CC* are larger than for *NIBEI.*[17]

The average rank of the median absolute forecast errors across years is presented as another summary measure of the results. To calculate this average rank, forecast errors were segregated by year. The median absolute error of each predictor variable was assigned a rank within each year. These ranks were aver-

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sis, available from the authors, do not support the contention that a more complex model would provide better predictions than model (1).

[16] The underlying distribution of forecast errors is skewed. The mean value is always larger than the median value (often twice as high). Means for the distribution of forecast errors were also calculated after trimming the upper five percent from the distribution of absolute forecast errors. The trimmed means are much closer to (though still above) the median, suggesting that the mean is being strongly influenced by a few high values. For this reason, the median is used as a measure of central tendency. Also, data on median absolute forecast errors for individual years from 1972 through 1981 are available from the authors.

[17] In every year, forecasts of *NIDPR* and *WCFO* have lower median percentage forecast errors than do forecasts of *NIBEI.* Assuming that model (1) is: a) the appropriate specification of user expectations, and b) that percentage deviations from the actual values of the CF series being predicted are the variables of interest to decision makers, this result suggests that traditional measures of CF may be more predictable than earnings. In contrast, alternative measures of CF (*CFO* and *CFAI*) and *CC* are more difficult to predict than earnings. Forecasts of alternative measures of cash flow always have higher median percentage forecast errors than do forecasts of *NIBEI*, which suggests a smoothing effect of the accrual process.

aged across years. The ranks provide additional information about the distribution of the forecast errors across years. For example, an average rank of 1.0 indicates that the predictor variable had the lowest median absolute forecast error in each of the ten years. Based on the data in Table 2, it appears that for all CF variables except *CFO*, a random walk model performs at least as well as, and usually better than, predictions based on variables with fewer adjustments along the continuum from *NIBEI* to *CC*.[18] The statistical significance of these differences is examined in Tables 3 and 4.

The statistical significance of differences in median absolute forecast error was evaluated for each CF variable using the Friedman two-way analysis of variance by ranks [Siegel, 1956, p. 166]. Results are reported in Table 3. For each of the five predicted variables, some predictors perform significantly better than others at the .01 level.

The statistical significance of the individual pairwise differences was evaluated using Sign tests [Siegel, 1956, p. 68]. These results are reported in Table 4. Significant individual diffeences include the following: this period's *NIDPR* better predicts one- and two-period-ahead *NIDPR* than does *NIBEI*; *WCFO* better predicts one- and two-period-ahead *WCFO* than does *NIBEI* or *NIDPR*; *CFAI* better predicts one- and two-period-ahead *CFAI* than does *NIDPR*, *WCFO* or *CFO*, and does at least as well as *NIBEI*; and *CC* better predicts one- and two-period-ahead *CC* than does *NIBEI*, *NIDPR*, *WCFO*, *CFO*, and *CFAI*. The exception to the general pattern is that *NIDPR* and *WCFO* are consistently the best predictors of *CFO*—both one period and two periods ahead (see Table 2).

Tests of Accrual versus Cash Flows as Predictors of Future CF

The purpose of this section is to interpret the results in Table 4 as a test of FASB assertions that accruals (and in particular earnings) are superior to historical CF as inputs to assessments of future CF. To describe the relative performance of accrual versus CF variables in predicting future CF, we must choose a definition of future CF. Not surprisingly, different definitions of CF lead to slightly different conclusions about the relative performance of accrual versus CF members.

Since random walk models perform at least as well as others, if either of the traditional measures of CF (*NIDPR* or *WCFO*) is the relevant measure of CF, then historical CF variables better predict future CF (see Table 4). However, in many decisions, the relevant CF variable may be closer to one of the alternative measures of CF. The results for predictions of *CFO* and *CFAI* are not clearcut.

First, for *CFO*, the Sign tests reported in Table 4 indicate that the traditional cash flow measures (*WCFO* and *NIDPR*) provide significantly better forecasts of one- and two-period-ahead *CFO* than does last period's *CFO*. However, we cannot reject the null that *NIBEI* and *CFO* provide equivalent forecasts of one- and two-period-ahead *CFO*. Thus, assuming that model (1) is the appropriate specification of decision makers' expectations and that *CFO* is the relevant measure of CF, these results only support the FASB statements if *NIDPR* and *WCFO* are considered to be "[i]nformation about enterprise earnings based on accrual accounting . . ." [FASB, 1978, p. ix].

Second, for *CFAI*, Table 4 indicates

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[18] To the extent that the adjustments tend to be positive in moving from *NIBEI* to *CC* (for example, *NIDPR* results from adding an always positive number (depreciation and amortization) to *NIBEI*), model (1) creates an upward bias in forecast errors for non-random walk models. However, allowing for the less constrained model discussed in footnote 15 had little effect on the ranking of the predictors.

TABLE 4
PAIRWISE SIGN TESTS OF THE NULL HYPOTHESIS THAT THE MEDIAN FORECAST ERROR USING PREDICTOR 'X_1' IS EQUAL TO THE MEDIAN FORECAST ERROR USING 'X_2'*

"CF" Variable Predicted	*Predictors Considered*		*Predictor with Lower Forecast Error*	*Significance Level* *Periods Ahead*	
	'X_1'	'X_2'		*One*	*Two*
NIDPR	NIDPR	NIBEI	NIDPR	.002	.004
WCFO	WCFO	NIDPR	WCFO	.002	.004
WCFO	WCFO	NIBEI	WCFO	.002	.004
WCFO	NIDPR	NIBEI	NIDPR	.002	.004
CFO	CFO	WCFO	WCFO	.022	.004
CFO	CFO	NIDPR	NIDPR	.022	.004
CFO	CFO	NIBEI	CFO	.754	.999
CFO	WCFO	NIDPR	NIDPR	.754	.999
CFO	WCFO	NIBEI	WCFO	.022	.004
CFO	NIDPR	NIBEI	NIDPR	.022	.004
CFAI	CFAI	CFO	CFAI	.022	.180
CFAI	CFAI	WCFO	CFAI	.022	.040
CFAI	CFAI	NIDPR	CFAI	.022	.040
CFAI	CFAI	NIBEI	CFAI	.344	.999
CFAI	CFO	WCFO	CFO	.110	.180
CFAI	CFO	NIDPR	CFO	.110	.508
CFAI	CFO	NIBEI	NIBEI	.002	.004
CFAI	WCFO	NIDPR	NIDPR	.002	.004
CFAI	WCFO	NIBEI	NIBEI	.002	.004
CFAI	NIDPR	NIBEI	NIBEI	.002	.040
CC	CC	CFAI	CC	.002	.004
CC	CC	CFO	CC	.002	.004
CC	CC	WCFO	CC	.002	.004
CC	CC	NIDPR	CC	.002	.004
CC	CFAI	CFO	CFAI	.002	.004
CC	CFAI	WCFO	CFAI	.002	.004
CC	CFAI	NIDPR	CFAI	.002	.004
CC	CFAI	NIBEI	CFAI	.344	.508
CC	CFO	WCFO	CFO	.022	.040
CC	CFO	NIDPR	CFO	.022	.040
CC	CFO	NIBEI	NIBEI	.002	.004
CC	WCFO	NIDPR	NIDPR	.002	.004
CC	WCFO	NIBEI	NIBEI	.002	.004
CC	NIDPR	NIBEI	NIBEI	.002	.004

* The alternative hypothesis is that the median forecast error using X_1 is not equal to the median forecast error using X_2. Column 4 lists the predictor that results in the lower forecast error. For example, when predicting future CFO using historical CFO versus WCFO, we can reject the null in favor of WCFO being a better predictor of future CFO than is past CFO.

that current period values of both *NIBEI* and *CFAI* are significantly better predictors of one- and two-period-ahead *CFAI* than is *NIDPR*, *WCFO*, or *CFO*. However, since we cannot reject the null that *CFAI* and *NIBEI* are equally good predictors of *CFAI*, the results do not support the FASB's statements that earnings are superior for predicting future CF.

In summary, the results do not clearly support the FASB's claims of the superiority of accrual numbers for predicting future cash flows. In fact, under a strict interpretation of the FASB's statements (that accruals are synonomous with earnings—not with *NIDPR* or *WCFO*), *none* of the results are consistent with the FASB's assertion of the superiority of earnings as predictors of future CF.

SUMMARY AND CONCLUSIONS

This paper reports descriptive evidence on the contemporaneous correlations between various measures of cash flow and accrual earnings. The results show that traditional measures of cash flow (i.e., net income plus depreciation and amortization, and working capital from operations) are highly correlated with earnings, while the correlations of alternative measures of cash flow with earnings are low. Thus, prior studies which have relied on traditional measures of cash flow have used a variable with substantially different properties than alternative measures of cash flow which incorporate additional adjustments. The combination of an observed market demand for these alternative measures of cash flow along with their relative lack of correlation with widely used traditional surrogates may stimulate a new round of empirical research.

Several forecast models were compared in order to (1) provide future researchers with evidence on measures of expected cash flow, and (2) evaluate assertions about the superiority of accrual earnings for predicting future cash flows. The results are preliminary due to the simplicity of the models chosen and the small number of years for which data are available. However, the results are generally consistent with random walk models performing as well as (and often better than) models based on other flow variables. An exception to this general result is that net income plus depreciation and amortization, and working capital from operations, appear to be the best predictors of cash flow from operations. In addition, the results based on simple one- and two-period-ahead forecast models do not support the FASB's assertions that earnings provide better forecasts of future cash flows than do cash flow measures.

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A Decision Support System for Audit-Staff Scheduling with Precedence Constraints and Due Dates

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ABSTRACT: A versatile computer model for audit-staff scheduling based on a zero-one integer program was presented by Balachandran and Zoltners [1981] (BZ). This paper extends the work of BZ by demonstrating how precedence constraints, due dates, penalty costs, resource leveling, and other audit considerations can be added to the zero-one integer program for audit scheduling. These additional features help improve the realism of the scheduling model, thus making the model more practical for applications.

With rising audit costs, client resistance to audit fee increases, and the growing complexity of audit operations, emphasis must be placed on improving audit planning and control. Since the scheduling of audit activities and manpower is an important aspect of audit planning and control, decision support systems that improve audit scheduling can help provide a better quality and a more cost-effective service.

This paper extends the integer programming model developed by Balachandran and Zoltner [1981] (BZ) for audit-staff scheduling. We add mainly (a) precedence constraints among audit tasks, (b) due dates and penalty costs for missing audit deadlines, and (c) a constraint that an auditor cannot process more than one audit task at a time into the integer programming model that serves as the basis of a decision support system.[1] The objective is to accommodate additional important, practical considerations into the original BZ model so that it can be more practically applied.

In the next section, the proposed extensions will be elaborated upon, followed by a section explaining the mathematical formulation of the extended BZ model. Then a numerical example demonstrating the implementation of the extended model is provided. The final section provides the concluding remarks.

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[1] As explained by BZ [1981, esp. pp. 807–809], the integer programming approach is superior to the approaches based on linear programming [Summers, 1972] and goal programming [Bailey, Boe, and Schnack, 1974; Balachandran and Steuer, 1982] for audit scheduling. Another heuristic approach was proposed by Chan, Lam, and Cheng [1978] which considers precedence constraints. However, it did not incorporate the variety of audit considerations of the integer programming model.

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THE EXTENDED BZ MODEL

The extended BZ model can incorporate all the audit considerations of the original model. In addition, the extended model has the following important features which make the model more practical for applications:

A. Precedence Relationships

As explained by Chan et al. [1978] and Krogstad et al. [1977], audit tasks in an engagement are interrelated and can be represented by a PERT network. Some tasks must be processed before other tasks can be carried out. This creates precedence relationships among tasks. Another form of precedence relations may be introduced by the desire or the requirement to process certain audit engagements ahead of others. All these precedence relationships must be taken into consideration in the implementation of any audit-staff schedule.

The original BZ model simply assigns the M tasks to N auditors without consideration of the precedence relations or the processing order or sequence. The extended BZ model can incorporate these precedence relationships directly into the model regardless of how complicated these interrelations may be.

B. Due Dates and Penalty Costs

Auditors are often faced with various deadlines (due dates) in completing audit engagements [Kearns and Myott, 1984]. Missing a deadline may result in a loss of business or a lateness penalty. To fulfill the aim of meeting deadlines, a penalty cost function is added to the objective function of the extended BZ model. The extended BZ model can take care of any number of deadlines for any audit tasks or engagements.

C. Arrival Times

Every engagement has an arrival time. The arrival time can be the contractual date or any time thereafter when the engagement becomes ready for processing. The arrival times of any audit engagements or tasks can be readily taken into consideration when applying the extended BZ model.

D. Concurrent Audit Tasks

The original BZ model can stipulate that any single auditor will not be assigned to more than one of several concurrent audit tasks. However, their formulation requires that the scheduler knows what audit tasks will run concurrently before actually assigning any tasks (see BZ [1981, p. 806]). When the engagement is large or when there is a large number of engagements to be scheduled simultaneously and the interrelationships among audit tasks are complicated, it is infeasible to find out beforehand what tasks will run concurrently and how to deal with it. The extended BZ model can prevent any one auditor being assigned to more than one concurrent task without the need for prior knowledge of what tasks will run concurrently.

MATHEMATICAL FORMULATION OF THE EXTENDED BZ MODEL

Like the original BZ model, the extended model is also based on a zero-one linear integer program. However, the formulation of the problem is different from the original model. Before stating the new formulation, we introduce the symbols used in the formulation.

Let

$i=1,2,\ldots,N$ be the auditor index where N is the total number of auditors,

$j=1,2,\ldots,M$ be the audit-task index where M is the total number of tasks,

$g=1,2,\ldots,G$ be the audit-engagement index where G is the total number of engagements,

$k=1,2,\ldots,T$ be the time-period index where T is the planning horizon,

C_{ij} be the mismatch coefficient between auditor i and task j (same as in the original BZ model),

t_{ij} be the estimated time required by auditor i to complete task j (same as in the original BZ model),

T_i^- be the minimum time auditor i is available for processing audit tasks within T (same as in the original BZ model),

T_i^+ be the maximum time auditor i is available for processing audit tasks within T (same as in the original BZ model),

J_i be the set of audit tasks that *can possibly be* processed by auditor i (but not necessarily by auditor i),

I_j be the set of possible auditors who *can* process audit-task j,

B_j be the set of tasks that directly precede task j,

e_j be the earliest completion time of task j which is obtained by applying the critical path method to the overall PERT network,

l_j be the latest completion time of task j which is obtained by applying the critical path method to the overall PERT network after setting the latest completion time of the final task in the network to T,

d_g be the due date of engagement g, and

$P_g \geq 0$ be the cost of having engagement g late for one period of time (a cost may also be assigned to any audit task with a due date and a lateness penalty).

Define

$$X_{ijk}=\begin{cases} 1 & \text{if auditor } i \text{ completes task } j \textit{ at the end} \text{ of period } k \\ 0 & \text{otherwise} \end{cases}$$

$$Ygk=\begin{cases} 1 & \text{if all the tasks of engagement } g \text{ are completed by period } k\text{, i.e., completed in or before period } k\text{-}1 \\ 0 & \text{otherwise} \end{cases}$$

The objective function of the zero-one linear integer program is:

Minimize

$$W=\sum_{i=1}^{N}\sum_{j\epsilon J_i}\sum_{k=e_j}^{l_j} C_{ij}X_{ijk} + \sum_{g=1}^{G}\sum_{k=d_g+1}^{T} P_g(1-Y_{gk}) \qquad (1)$$

The first component in (1) represents the mismatch cost, equivalent to that in the original BZ model. Notice that j is summed over J_i, which is known beforehand when the problem is set up. J_i is used here to reduce the number of decision variables. In the event that J_i is not readily available, j may then be summed from one to M. The second component in (1) represents the penalty cost for delaying the completion of an engagement. The total penalty cost for delaying an engagement increases in direct proportion to the length of the delay. Different penalty costs may be set for different engagements. If lateness is not allowed for a given engagement, a very high penalty cost may be assigned to that engagement. (This component can be modified in a straightforward manner if certain individual audit tasks also have deadlines and lateness penalties.)

The problem has the following constraints (A to E):

A. The availability of auditor's time:

$$T_i^- \le \sum_{j, J_i} \sum_{k=e_j}^{l_j} t_{ij} \cdot X_{ijk} \le T_i^+, \text{ for each } i=1,2,\ldots,N \tag{2}$$

Again, if J_i is not readily available, j may then be summed from one to M.

B. Each audit task must be completed by exactly one auditor:

$$\sum_{i \in I_j} \sum_{k=e_j}^{l_j} X_{ijk} = 1, \text{ for each } j=1,2,\ldots,M. \tag{3}$$

This constraint also serves to restrict that a given audit task j should receive certain auditors as included in the set I_j according to client preference or company policy. Constraints A and B are equivalent to the constraints in the original BZ model.

C. The existence of precedence or sequencing relationships among audit tasks, i.e., an audit task cannot be started before the completion of all its predecessors:

$$\sum_{i \in I_h} \sum_{k=e_h}^{l_h} k \cdot X_{ihk} + \sum_{i \in I_j} \sum_{k=e_j}^{l_j} t_{ij} \cdot X_{ijk} - \sum_{i \in I_j} \sum_{k=e_j}^{l_j} k \cdot X_{ijk} \le 0,$$

$$\text{for each } h \in \mathrm{B}_j \text{ and } j=1,2,\ldots,M. \tag{4}$$

D. An auditor cannot process more than one audit task at any given time. A task with duration t_{ij} is being processed in period k if the task is completed in period q where

$$k \le q \le k + t_{ij} - 1,$$

provided $k \ge e_j$ and $k + t_{ij} - 1 \le l_j$. Therefore, this resource-limiting constraint can be written as:

$$\sum_{j \in J_{i(k)}} \sum_{q=k}^{k+t_{ij}-1} X_{ijq} \le 1 \text{ for each } k=1,2,\ldots,T \text{ and } i=1,2,\ldots,N, \tag{5}$$

where $J_{i(k)}$ is the set of tasks auditor i can process in period k. Constraint (5) prevents an auditor from being assigned to more than one audit task in period k for any $k=1,2,\ldots,T$. This feature is referred to as resource leveling.

E. The following constraints determine the number of delay periods and establish a relationship between X_{ijk} and Y_{gk}:

$$\sum_{k=e_j'}^{T} Y_{gk} = T - \sum_{i \in I_j'} \sum_{k=e_j'}^{l_j'} k \cdot X_{ij'k} \tag{6}$$

and $y_{gk} \leq 1$ for each $g=1,2,\ldots,G$, where j' is the task in the engagement with the largest e_j (i.e., the terminal task of engagement g).

A major addition of the extended BZ model is that it considers the time dimension in scheduling audit tasks while the original model does not. With the extended model, the arrival time of each engagement can be readily incorporated into the scheduling process when setting up the overall PERT network. This can be done, for example, by appending an appropriate dummy task at the beginning of each engagement. Similarly, the due dates, penalty costs, precedence relations, and resource leveling are incorporated. Furthermore, the schedules of the individual audit engagements and the auditors can easily be derived because of the consideration of the time element.

In the above formulation, the use of the sets I_j and J_i reduces the number of decision variables since the alternatives are for j to start from one to M and i from one to N. Similarly, the use of e_j and l_j can also significantly reduce the number of variables, as the alternative will be for k to start from one and end in T, as illustrated in the example presented in the next section. Finally, in setting up I_j, J_i, and C_{ij}, factors such as clients' preferences for certain auditors, auditors' preferences for certain tasks, auditors' personalities and experiences, and audit firm policies can be incorporated into consideration.

AN ILLUSTRATIVE EXAMPLE

Consider the following scheduling problem which consists of four auditors, two audit engagements, and a planning horizon of 12 weeks. The first engagement is broken down into eight audit tasks and the second engagement into ten audit tasks. Table 1 contains the parameters of the audit engagements, the precedence relations among the tasks, durations, mismatching costs, and the availability of the auditors. The precedence relations and the arrival times are used to construct the PERT network of the two engagements as shown in Figure 1.

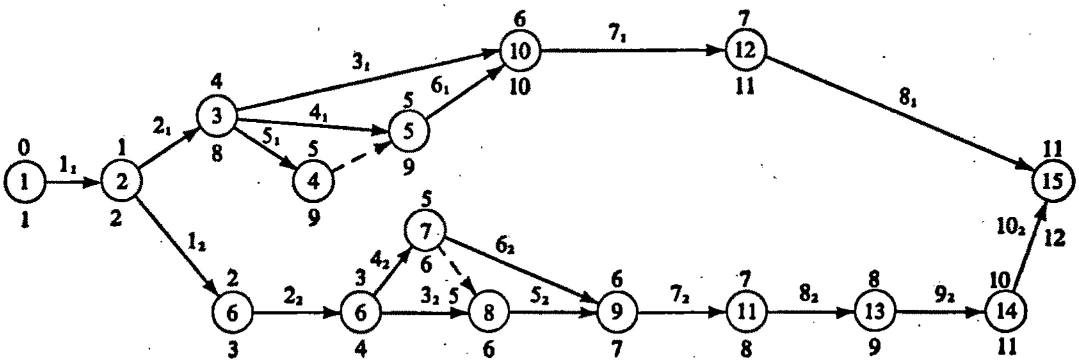
The longest path method is applied to the network of Figure 1 to give the earliest start time (and earliest completion time) of every task; these are the numbers written above the starting nodes of the arcs representing the audit tasks. Assigning $T=12$ (the planning horizon) to be the latest realization time of the final event in the audit process, then applying the longest path method in the reverse direction, we obtain the latest completion time (and latest start time) of every audit task; these are the numbers written below the ending nodes of the arcs representing the audit tasks.

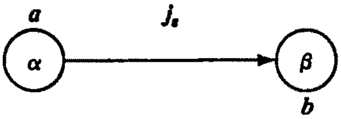
The zero-one integer linear program is solved using general branch and bound procedure, one of the most common and practical procedures for solving integer programs, particularly zero-one integer linear programs. (See, for example, Taha [1975] and Davis [1973].) The branch and bound procedure used here is that developed by Schrage [1984] and known as LINDO (Linear Interactive Discrete Optimizer). The IBM MPSX/370 MIP, which is available in many large businesses, can also solve such a program efficiently (see Bruvold and Evans [1985]). LINDO has the capacity to solve problems with up to 1,100 constraints and 4,000 variables, while MPSX of IBM has much larger capacity. Both LINDO and MPSX give optimal feasible schedules. If the objective is to obtain near optimal feasible schedules, then both LINDO and MPSX, along with most of the heuristics cited in Davis [1973] for project planning and resource leveling, can be used.

TABLE 1
INPUT DATA FOR AN AUDIT SCHEDULING PROBLEM

Engagement (g)	Arrival Time (r_g)	Due Date (d_g)	Delay Cost $/week ($P_g$)	Task (j)	Preceding Tasks ($h \epsilon B_j$)	Auditors (i) 1		2		3		4	
						c_{1j} $	t_{1j} weeks	c_{2j} $	t_{2j} weeks	c_{3j} $	t_{3j} weeks	c_{4j} $	t_{4j} weeks
1	0	9	2000	1	—	0	1						
				2	1	2000	3	0	3				
				3	2			1000	1	0	1	0	1
				4	2			1000	1	0	1	0	1
				5	2			1000	1	0	1	0	1
				6	4,5			1000	1	0	1	0	1
				7	3,6	2000	1	0	1				
				8	7	0	1						
2	1	12	2000	1	—	0	1						
				2	1	2000	1	0	1				
				3	2			1000	2	0	2	0	2
				4	2			1000	2	0	2	0	2
				5	3,4			1000	1	0	1	0	1
				6	4			1000	1	0	1	0	1
				7	5,6			1000	1	0	1	0	1
				8	7	0	1	1000	1				
				9	8	2000	2	0	2	1000	2	1000	2
				10	9	0	1						
T_i^- (min. available time in weeks)						2		4		4		4	
T_i^+ (max. available time in weeks)						7		7		7		7	

FIGURE 1
THE PERT NETWORK OF THE AUDIT TASKS OF TABLE 1



Note: 

, where

the arrow (arc) represents the audit task and the nodes represent the events of the auditing process,
j_g is audit task j of engagement g,
a is earliest start time of audit task j in engagement g, and
b is latest completion time of audit task j in engagement g.

In the above example, applying LINDO to the zero-one integer linear program which consists of the first component in (1) as the objective function and constraints (2) and (3) only, i.e., the equivalent of the original BZ model, gave the schedule shown in Gantt Chart (A) of Figure 2. the schedule is optimal in the sense that the total mismatching cost equals zero. However, if we assume that an auditor cannot audit more than one task at a time, then the schedule of Gantt Chart (A) is not feasible since auditor 2 has to audit more than one task in period 4, auditor 3 has to audit more than one task in period 7, and similarly for auditor 4. Furthermore, some of the precedence relations among tasks are not holding. Shifting some of these tasks around to obtain a feasible schedule does not appear to be an easy task even for a nonlarge example. Adding the constraints of the extended BZ model ensures the feasibility of the schedule generated. Applying LINDO to the extended integer program gave the schedule shown in Gantt Chart (B) of Figure 2; its total mismatching and delay cost is $3,000.00. The optimal feasible schedule presented in Gantt Chart (B) also gives the schedule of every auditor and engagement.

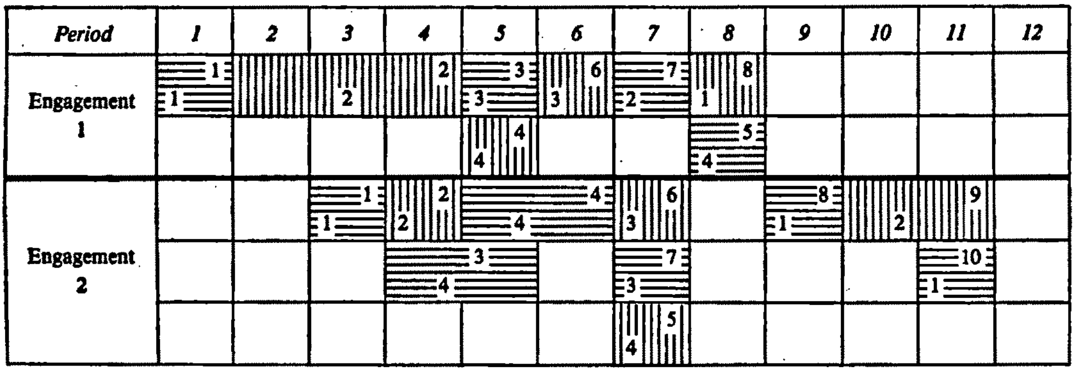
CONCLUDING REMARKS

This paper extends the work of BZ by adding precedence constraints, due dates and penalty costs, and other audit considerations into their scheduling model, which serves as the basis of a decision support system. Audit tasks in an engagement are typically interrelated. These precedence relationships must be considered in the actual implementation of any audit-staff schedule. Further-

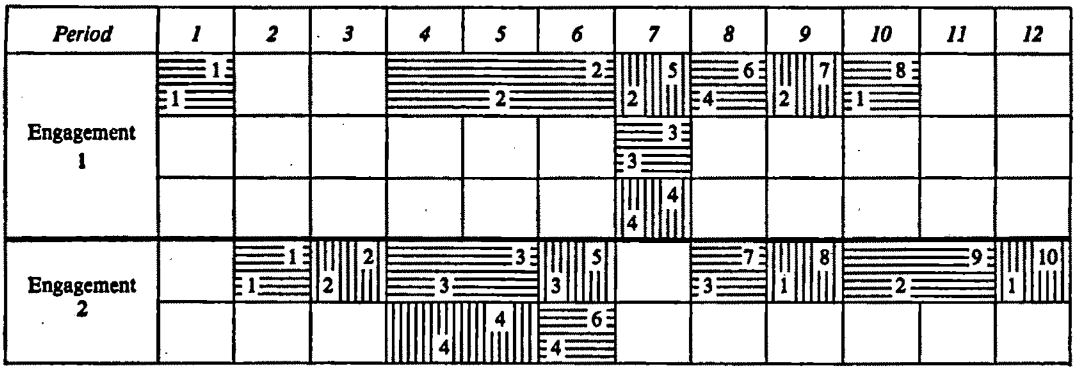
FIGURE 2

OPTIMAL SCHEDULES OBTAINED FROM THE ORIGINAL AND THE EXTENDED INTEGER LINEAR PROGRAMS

GANTT CHART (A): The Optimal Schedule Obtained by the Equivalent of the Original BZ Model



GANTT CHART (B): The Optimal Schedule Obtained by the Extended BZ Model



Note: in $\boxed{i \quad j}$

i: is the auditor number
j: is the audit task number

more, any delay of the completion of an audit involves some costs to the audit firm, such as excessive cost overruns that cannot be passed on to clients, loss of goodwill, or a lateness penalty. Explicitly modeling due dates and penalty costs in a scheduling system helps to emphasize the importance of this facet of real life in auditing. Similarly, the desire not to overload the auditor requires the auditor not to process more than one audit task at a time. The accommodation of these important practical problems into the scheduling model facilitates the model's applications in practice.

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Six Decades of *The Accounting Review*: A Summary of Author and Institutional Contributors

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ABSTRACT: Publication of the October 1985 issue of *The Accounting Review* marked the culmination of the journal's first 60 years of contributions to the profession. This study identifies and summarizes the contributing authors, their academic affiliation, and where they earned their doctoral degrees. The authors, academic employers, and doctoral degree-granting institutions appearing most frequently in the journal are ordered for the entire 60-year period and for three 20-year subperiods.

During its first six decades, *The Accounting Review* (*AR*) has had a significant influence on the development of accounting concepts. The first issue of the *AR* appeared in March 1926, five years after the publication was proposed. Initially, there was concern about whether splitting articles between the *Journal of Accountancy* and the proposed publication would produce two weak journals [Chatfield, 1975]. Studies by Coe and Weinstock [1969] and Benjamin and Brenner [1974] have verified that the *AR* is highly regarded by accounting educators. Thus, the *AR* has continued to be a coveted publication outlet.

This note presents another perspective on the articles of *The Accounting Review*. It provides a summary description of authorship over the *AR*'s 60 years. Specifically, frequency distribution by author, institution of employment, and university where doctoral degree was earned are summarized for three 20-year periods and the entire 60 years. The results identify those individuals and institutions having made the most frequent contributions to the *AR*.

INDIVIDUAL AUTHORSHIP

The first objective of this study is to identify those individual authors who have made the most frequent contributions to the *AR*. The objective was accomplished by compiling and summarizing the articles in all issues of *The Accounting Review* over the journal's past 60 years (1926–1985).

Articles were tabulated two ways. First, "all articles" are defined to include all main articles and notes, as well as those appearing in the Education Research (formerly the Teacher's Cor-

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ner) and Financial Reporting Sections. Excluded from the count totals are comments and replies and those contributions that appeared under a regularly featured column, such as "Professional Examinations Department" and "The Accounting Exchange."

Second, a compilation of "main articles and notes" only was made. This compilation provides for some comparability with prior studies by Windal [1981], Bazley and Nikolai [1975], Jacobs et al. [1986] and Williams [1985], which excluded some sections from their data. Because the *AR* was not divided into sections until the introduction of "Teacher's Corner" in 1948, the counts for "all articles" and "main articles and notes" in Tables 1 through 4 are identical for the first bi-decade period (1926–1945). No attempt was made to determine which articles in pre-1948 issues were "educational" or "financial reporting" as any such attempt would be subjective and likely flawed.

A frequency count by authors is presented in Table 1. In the left-hand column for each time period, authors are ordered by number of all articles published, including co-authored articles. The right-hand column includes "main articles and notes" only. Ordering of authors was also compiled for 20-year periods. A few authors appear on more than one bi-decade list because their contributions span more than one 20-year time period. For the entire 60-year period, A. C. Littleton heads the list with 40 articles, followed by Harold Bierman with 20. Littleton's contributions to accounting in the *AR* have also been documented by Bedford and Ziegler [1975].

The listing in each column is cut off at approximately 20. Ties in the frequency counts caused a higher or lower cut-off. The counts that follow the named authors continue the ordering for "all articles." The frequency counts for "main articles and notes" correspond to the number of authors in brackets. Column totals within a time period may not be equal as some of the frequency counts for authors with a specific number of publications in the "main articles and notes" column may include an author named farther up the list.

For the 20-year subperiods the leading contributors were A. C. Littleton with 29 (1926–45), Mary Murphy with 12 (1946–65), and Joel Demski and Lawrence Revsine tied with 13 (1966–85). A. C. Littleton also distinguished himself by having articles in all three 20-year subperiods. Examination of "main articles and notes" for the entire 60-year and three bi-decade periods indicates little difference in the ordering over "all articles."

Over the *AR*'s 60-year history, 2,139 authors have contributed a total of 3,467 articles. Among those contributors, only 394, or 18.4 percent, have more than two articles. The number of authors and articles appearing in the *AR* over the years are as follows:

	Authors	*All Articles*
1926–45	390	714
1946–65	866	1,464
1966–85	1,135	1,289
1926–85	2,391	3,467

The difference between the total number of authors over all 60 years and the sum total of authors from the three subperiods (2,391 − 2,139 = 252) results from authors spanning multiple bi-decade periods. The increasing number of authors and articles reflects the growth of accounting as an academic discipline and the observable rise of co-authorship.

TABLE 1
DISTRIBUTION OF ACCOUNTING REVIEW AUTHORS BY UNADJUSTED ARTICLES

1926–1985			*1926–1945*			*1946–1965*			*1966–1985*		
Author	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*
A. C. Littleton	40	38	A. C. Littleton	29	29	Mary Murphy	12	11	Joel Demski	13	13
Harold Beirman	20	19	Dr. Scott	11	11	Harold Avery	11	10	Lawrence Revsine	13	9
Robert Mautz	16	12	Herbert Taggart	10	10	Harold Bierman	10	10	Harold Bierman	10	9
Mary Murphy	16	15	Stanley Howard	9	9	William Campfield	10	9	A. R. Abdel-khalik	9	8
Harold Avery	15	14	Perry Mason	9	9	A. C. Littleton	10	8	Yuji Ijiri	9	9
E. L. Kohler	15	15	William Paton	9	9	Kenneth Perry	10	4	Robert Kaplan	9	9
Harry Kerrigan	14	13	C. Rufus Rorem	9	9	Sidney Simon	10	10	Rene Manes	8	5
William Paton	14	13	L. L. Briggs	8	8	Charles Horngren	9	7	James McKeown	8	5
Joel Demski	13	13	James Dohr	8	8	Robert Mautz	9	6	Robert Ashton	7	6
Charles Horngren	13	10	Howard Greer	8	8	Frank Singer	9	7	William Beaver	7	7
Lawrence Revsine	13	9	Harry Kerrigan	8	8	Robert Van Voorhis	9	4	Ronald Copeland	7	4
Dr. Scott	13	13	E. L. Kohler	8	8	Lawrence Benninger	8	8	Edward Deakin	7	4
George Staubus	13	12	Gabriel Preinreich	7	7	Arthur Lorig	8	7	Don DeCoster	7	5
Herbert Taggart	13	12	Frank Smith	7	7	Williard Stone	8	4	Robert Jensen	7	7
Norton Bedford	12	11	Henry Sweeney	7	7	Norton Bedford	7	6	John Livingstone	7	7
James Dohr	12	12	William Castenholz	6	6	Sidney Davidson	7	5	Enrico Petri	7	7
Howard Greer	12	12	David Himmelblau	6	6	George Husband	7	7	Robert Swieringa	7	5
George Husband	12	12	Lloyd Morey	6	6	Robert Jaedicke	7	6	Roman Weil	7	1
Arthur Lorig	12	11	Hiram Scovill	6	6	E. L. Kohler	7	7	Jerry Weygandt	7	6
Perry Mason	12	12	8 (8) Authors	5	5	John Myers	7	6	16 (6) Authors	6	6
* 4 (3) Authors	11	11	16 (16) Authors	4	4	Ralph Snyder	7	7	18 (18) Authors	5	5
9 (7) Authors	10	10	31 (31) Authors	3	3	George Staubus	7	7	32 (25) Authors	4	4
11 (10) Authors	9	9	56 (56) Authors	2	2	12 (7) Authors	6	6	63 (41) Authors	3	3
14 (9) Authors	8	8	261 (261) Authors	1	1	20 (17) Authors	5	5	215 (125) Authors	2	2
30 (16) Authors	7	7				37 (29) Authors	4	4	773 (597) Authors	1	1
34 (25) Authors	6	6				74 (58) Authors	3	3			
53 (44) Authors	5	5				144 (132) Authors	2	2			
72 (60) Authors	4	4				558 (494) Authors	1	1			
147 (122) Authors	3	3									
379 (281) Authors	2	2									
1368 (1153) Authors	1	1									

* Frequency of authors for main articles & notes in parentheses.

TABLE 2

DISTRIBUTION OF ACCOUNTING REVIEW AUTHORS BY ADJUSTED ARTICLES

1926–1985			*1926–1945*			*1946–1965*			*1966–1985*		
Author	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*
A. C. Littleton	38.8	36.8	A. C. Littleton	27.8	27.8	Mary Murphy	12.0	11.0	Lawrence Revsine	10.2	6.7
Harold Bierman	18.3	17.3	Dr. Scott	11.0	11.0	Harold Avery	10.5	9.5	Joel Demski	9.2	9.2
Mary Murphy	16.0	15.0	Herbert Taggart	9.1	9.1	William Campfield	10.0	9.0	Harold Bierman	9.0	8.0
Harold Avery	14.5	13.5	Stanley Howard	9.0	9.0	A. C. Littleton	10.0	8.0	A. R. Abdel-khalik	6.8	5.8
E. L. Kohler	13.7	13.7	Perry Mason	9.0	9.0	Sidney Simon	10.0	10.0	Yuji Ijiri	6.5	6.5
Robert Mautz	13.5	10.0	William Paton	9.0	9.0	Harold Bierman	9.3	9.3	Robert Kaplan	6.3	6.3
Harry Kerrigan	13.5	12.5	C. Rufus Rorem	9.0	9.0	Kenneth Perry	9.0	4.0	Robert Ashton	6.0	5.0
William Paton	13.2	12.2	L. L. Briggs	8.0	8.0	Frank Singer	9.0	7.0	Raymond Chambers	6.0	6.0
Dr. Scott	13.0	13.0	James Dohr	8.0	8.0	Robert Van Voorhis	9.0	4.0	Billy Goetz	6.0	2.0
George Staubus	13.0	12.0	Howard Greer	8.0	8.0	Robert Mautz	8.5	6.0	George Staubus	6.0	5.0
Herbert Taggart	12.1	11.1	Harry Kerrigan	7.5	7.5	Lawrence Benninger	8.0	8.0	Robert Jensen	5.8	5.8
George Husband	12.0	12.0	E. L. Kohler	7.5	7.5	Arthur Lorig	8.0	7.0	James McKeown	5.7	3.3
Arthur Lorig	12.0	11.0	Gabriel Preinreich	7.0	7.0	Williard Stone	8.0	4.0	Orace Johnson	5.5	4.5
Perry Mason	12.0	12.0	Frank Smith	7.0	7.0	Charles Horngren	7.5	5.5	Edward Deakin	5.3	3.5
Charles Horngren	11.5	8.5	Henry Sweeney	7.0	7.0	Sidney Davidson	7.0	5.0	John Livingstone	5.3	5.3
James Dohr	11.2	11.2	William Castenholz	6.0	6.0	George Husband	7.0	7.0	D. Larry Crumbley	5.0	4.5
Howard Greer	11.2	11.2	Hiram Scovill	6.0	6.0	John Myers	7.0	6.0	Keith Shwayder	5.0	5.0
William Campfield	11.0	10.0	David Himmelblau	5.3	5.3	George Staubus	7.0	7.0	Robert Swieringa	5.0	4.0
Frank Singer	11.0	7.0	Lloyd Morey	5.3	5.3	E. L. Kohler	6.2	6.2	Milton Usry	5.0	1.0
Lawrence Revsine	10.2	6.7	Russell Bowers	5.0	5.0	Norton Bedford	6.0	5.0	Rene Manes	4.8	2.5
Russell Bowers	10.0	9.0	William Graham	5.0	5.0	A. B. Carson	6.0	6.0	Hugo Nurnberg	4.8	3.0
Raymond Chambers	10.0	10.0	George Husband	5.0	5.0	Donald Corbin	6.0	5.0	Robert Sterling	4.8	3.8
Sidney Simon	10.0	10.0	Earl Saliers	5.0	5.0	S. Paul Garner	6.0	4.0	Roman Weil	4.8	1.0
Frank Smith	10.0	10.0	Norman Webster	5.0	5.0	Delmer Hylton	6.0	6.0	Jerry Weygandt	4.5	4.0
* 14 (8) Authors	9–9.9	9–9.9	Sidney Winter	5.0	5.0	Harry Kerrigan	6.0	5.0	William Kinney	4.3	3.3
7 (9) Authors	8–8.9	8–8.9	17 (17) Authors	4–4.9	4–4.9	David Li	6.0	5.0	William Beaver	4.2	4.2
17 (7) Authors	7–7.9	7–7.9	26 (26) Authors	3–3.9	3–3.9	Donald Raun	6.0	5.0	Richard Brief	4.2	4.2
21 (22) Authors	6–6.9	6–6.9	56 (56) Authors	2–2.9	2–2.9	Ralph Snyder	6.0	6.0	10 (11) Authors	3–3.9	3–3.9
39 (26) Authors	5–5.9	5–5.9	250 (250) Authors	1–1.9	1–1.9	Zenon Zannetos	6.0	6.0	110 (65) Authors	2–2.9	2–2.9
64 (52) Authors	4–4.9	4–4.9	16 (16) Authors	<1.0	<1.0	13 (12) Authors	5–5.9	5–5.9	468 (372) Authors	1–1.9	1–1.9
106 (94) Authors	3–3.9	3–3.9				36 (27) Authors	4–4.9	4–4.9	484 (333) Authors	<1.0	<1.0
282 (221) Authors	2–2.9	2–2.9				65 (49) Authors	3–3.9	3–3.9			
1008 (887) Authors	1–1.9	1–1.9				142 (119) Authors	2–2.9	2–2.9			
557 (399) Authors	<1.0	<1.0				482 (439) Authors	1–1.9	1–1.9			
						100 (86) Authors	<1.0	<1.0			

* Frequency of authors for main articles & notes in parentheses.

Another way to view the authors' quantitative contributions is to look at adjusted articles, sometimes called equivalent number of articles. On an adjusted article basis, a single-authored article counts as one. For multiple-authored articles, each author is credited with an article equivalent determined by dividing one by the number of authors of an article. Applying this adjusting system, Table 2 shows the authors by adjusted articles. For the 1926–85 period, there is only minor change in ordering for the first eight authors. On an adjusted basis, A. C. Littleton is still the leader for the entire 60 years as well as the first 20-year subperiod. Mary Murphy again heads the list for the second bi-decade (1946–65), while Lawrence Revsine does likewise for the third bi-decade (1966–85) on an adjusted basis. The most notable reordering between "all articles" and "main articles and notes" occurs in the 1966–1985 bi-decade period, where Revsine and Demski would trade places at the top of the two respective lists.

As the data in Tables 1 and 2 indicate, few authors have published in the *AR* multiple times. The percentage of authors with three or more articles is:

	Unadjusted	*Adjusted*
1926–45	19.0%	17.4%
1946–65	19.1	16.5
1966–85	13.0	6.5
1926–85	18.4	13.7

These percentages suggest that achieving multiple publications in the *AR* has been on the decline.

The authors appearing in Tables 1 and 2 might appear to be a list of Who's Who in accounting education. This view has more merit, however, for the earlier years than the later years. This is so because the *Journal of Accounting Research* appeared in 1963 and quickly gained recognition as another prominent publication outlet for academic research. Additionally, since 1963, 22 other academic journals have appeared as publication outlets [Dyckman and Zeff, 1984]. Thus, some prominent accounting researchers are missing from the lists, or have reduced counts, as the research and publication "wealth" has been spread over more journals in the past two decades. The authors listed have, nonetheless, played an important role in making *The Accounting Review* a highly respected quality publication over its 60 years.

AUTHORSHIP BY INSTITUTIONAL AFFILIATION

Contributions to *The Accounting Review* are often associated with the institutional affiliation of authors. While it is inevitable that an author's publishing career will end, institutional contributions can span many lifetimes. Accomplished authors may, for example, reach a mentoring stage and adopt a younger scholar at their institution who will continue to publish in the *AR*. Also important is that institutional pressures or traditions that motivate faculty to publish in the *AR* may develop.

Institutional affiliation of authors in the *AR* is summarized in Table 3. The top 29 academic institutions (with ties) are ordered according to a compilation of adjusted articles for the 60 years. Using unadjusted articles would have resulted in the same basic top 20 schools with only slight reordering well down the list. As with the previous tables, ordering by "main articles and notes" results in little difference in ordering over "all articles."

Six of the top ten overall (marked by an * in Table 3) are in the top 20 for each of the three bi-decades. Only two schools (marked by a # in Table 3) are in the top

TABLE 3

DISTRIBUTION OF ACADEMIC EMPLOYERS OF ACCOUNTING REVIEW AUTHORS BY ADJUSTED ARTICLES

1926–1985			*1926–1945*			*1946–1965*			*1966–1985*		
Author	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*
Illinois*#	214.2	179.2	Illinois	80.0	80.0	Illinois	95.5	70.0	Texas	54.8	41.1
Texas	86.8	66.1	Michigan	28.6	28.6	UC Berkeley	50.0	46.0	Illinois	38.7	29.2
UC Berkeley*	79.7	73.7	Northwestern	17.8	17.8	Michigan State	35.5	28.5	Washington, U. of	30.3	22.8
Michigan*	75.0	66.0	Chicago	17.0	17.0	Washington, U. of	32.5	29.0	Chicago	30.0	26.8
Chicago*#	74.8	65.7	Harvard	13.5	13.5	Chicago	27.8	21.8	Pennsylvania State	27.5	18.0
Washington, U. of*	69.8	58.8	Pennsylvania	12.0	12.0	UCLA	27.0	23.0	Stanford	27.3	26.0
Northwestern*	58.8	51.8	Columbia	12.0	12.0	Texas	27.0	20.0	Michigan	26.2	22.2
Michigan State	57.2	41.3	Minnesota	12.0	12.0	Pennsylvania	26.0	19.0	Northwestern	25.4	22.4
Pennsylvania State	47.8	34.3	Missouri	11.0	11.0	Alabama	24.0	13.0	Cornell	22.6	19.6
Pennsylvania	46.0	39.0	CUNY	10.0	10.0	Ohio State	22.0	17.0	Michigan State	20.7	11.8
UCLA	45.0	38.0	UC Berkeley	10.0	10.0	Cal. St. LA	21.0	16.0	NYU	20.5	18.7
Stanford	45.0	43.7	Princeton	10.0	10.0	Michigan	20.7	15.7	Iowa	20.0	14.7
Ohio State	42.2	33.1	Ohio State	7.1	7.1	Pennsylvania State	18.3	14.3	Purdue	19.8	17.4
Missouri	37.3	30.0	UCLA	7.0	7.0	MIT	17.8	17.8	UC Berkeley	19.7	17.7
Columbia	37.0	33.0	Iowa	7.0	7.0	Northwestern	15.7	11.7	Missouri	19.3	12.0
NYU	35.5	32.7	Washington, U. of	7.0	7.0	Indiana	14.8	10.8	Kansas	18.7	13.7
Wisconsin	33.5	26.5	Case Western	6.1	6.1	Columbia	14.2	12.2	Florida	18.2	15.2
Cornell	33.4	30.4	Antioch	6.0	6.0	Southern Calif.	14.0	10.0	Wisconsin	17.5	12.5
Harvard	33.3	31.3	LSU	6.0	6.0	NYU	12.0	11.0	Oklahoma State	17.0	7.8
MIT	33.2	31.2	Stanford	6.0	6.0	Stanford	11.7	11.7	Carnegie Mellon	16.8	15.8
Indiana	32.8	23.0	Vermont	6.0	6.0	Colorado	11.5	6.0	Georgia	15.3	8.0
Alabama	30.8	18.3	Wisconsin	6.0	6.0	Florida	11.0	9.0	Virginia Tech	14.8	4.3
Florida	30.2	25.2	Yale	6.0	6.0	Massachusetts	11.0	7.0	North Carolina	14.3	9.5
Kansas	29.7	22.7	Indiana	5.1	5.1	Miami	11.0	8.0	Arizona State	13.8	8.0
Southern Calif.	28.3	21.8	MIT	5.0	5.0	Rutgers	11.0	10.0	Massachusetts	13.2	9.2
Iowa	28.0	22.7	Texas	5.0	5.0	Cornell	10.8	10.8	Southern Calif.	13.2	10.7
Carnegie Mellon	27.3	25.3	Bradley	4.0	4.0	Harvard	10.5	10.0	Ohio State	13.0	9.0
Minnesota	25.8	23.8	Johns Hopkins	4.0	4.0	Oregon	10.5	9.5	Indiana	12.8	7.0
Cal. State LA	25.0	16.0	La Salle Ext.	4.0	4.0	Wayne State	10.5	10.5	Arizona	11.3	10.3
†337 (286) Schools	<25.0	25.0	Rochester	4.0	4.0	Tulane	10.0	9.0	UCLA	11.0	8.0
			72 (72) Schools	<4.0	4.0	Wisconsin	10.0	8.0	227 (184) Schools	<11.0	11.0
						169 (155) Schools	<10.0	10.0			

* Institutions in top ten overall and also in top twenty for each of the three bidecade periods for all articles.

# Institutions in top ten overall and in each of the three bidecade periods for all articles.

+ Frequency of schools for main articles and notes in parentheses.

ten for each of the three bi-decade periods and the entire 60-year period. Overall, the top 20 institutions have accounted for 34.2 percent of the articles in the *AR*. In each of the 20-year periods, the top 20 institutions accounted for the following percentage of total articles:

	Percent of All Articles
1926–45	40.0%
1946–65	35.9
1966–85	35.9

While the composition of the schools has changed, the proportion of the total articles attributable to the most prolific schools has remained fairly stable.

Despite some evidence of institutional dominance by a small group of schools, there have been contributions from a total of 360 different academic institutions. Equally important have been the contributions by nonacademic institutions. Among the *AR*'s contributing authors' employers are numerous public accounting firms, government agencies, and industrial firms. The contributions made through these nonacademic employers are best detailed by examining the following proportions of the total articles during the various time periods:

	1926–85	*1926–45*	*1946–65*	*1966–85*
Government	3.1%	5.5%	4.4%	.4%
Industry	4.8	7.1	7.2	.9
Public Accounting	4.3	7.8	5.2	1.3
Big Eight Firms	2.1	1.0	2.7	1.5
All Non-academic	14.3	21.4	19.1	4.1

Among the Big Eight firms, Price Waterhouse is 41st with 18.17 equivalent articles, and Touche Ross is 46th with 15.83 for the entire 60-year period. In fact, Price Waterhouse would be 19th during the 1946–65 subperiod if grouped with the academic institutions. Although the nonacademic institutional representation has declined during the last 20 years, its overall contribution to the *AR* is substantial and noteworthy.

AUTHORSHIP BY DEGREE-GRANTING INSTITUTION

While the institutional affiliation of authors in *The Accounting Review* is evident to readers, examination of where authors earned their doctoral degrees offers another interesting perspective on contributors to the *AR*. The universities granting doctoral degeees to the *AR*'s contributing authors were determined from the *Comprehensive Dissertation Index* [1861–1985] and the *Accounting Faculty Directory* [Hasselback, 1985].

Table 4 details the doctoral degree-granting institutions' frequency of contributions to the *AR*. A total of 98 schools have awarded doctoral degrees to individuals who have authored *The Accounting Review* articles. As would be expected, many of the authors, particularly in the early years, did not have a doctorate, and some of the degreed authors did not receive their doctorates in accounting. The total number of doc-

TABLE 4

DISTRIBUTION OF INSTITUTIONS GRANTING DOCTORATES TO ACCOUNTING REVIEW AUTHORS BY ADJUSTED ARTICLES

1926–1985			*1926–1945*			*1946–1965*			*1966–1985*		
Author	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*	*Author*	*All Articles*	*Main Articles and Notes*
Illinois*#	326.3	270.2	Illinois	62.4	62.4	Illinois	152.5	121.5	Illinois	111.9	86.3
Michigan*#	207.5	183.6	Michigan	52.1	52.1	Michigan	98.5	87.5	Chicago	61.0	51.2
Chicago*#	167.0	144.7	Chicago	36.5	36.5	Chicago	69.5	57.0	Texas	60.7	36.5
Texas*	120.7	80.5	Columbia	28.0	28.0	Texas	55.0	39.0	Michigan	56.8	44.0
Columbia*	89.6	81.8	Pennsylvania	14.0	14.0	Columbia	37.3	33.3	Ohio State	52.3	41.8
Ohio State	81.3	64.8	Northwestern	10.5	10.5	UC Berkeley	36.0	32.0	Michigan State	49.0	34.8
UC Berkeley*	69.8	61.5	Yale	10.5	10.5	Minnesota	33.7	28.7	Stanford	47.8	43.0
Stanford*	65.8	59.0	Princeton	9.0	9.0	Indiana	33.2	25.2	Wisconsin	30.5	18.7
Minnesota*	64.5	52.8	Harvard	8.5	8.5	Ohio State	29.0	23.0	UC Berkeley	29.3	25.0
Michigan State	62.0	46.8	Pittsburgh	7.0	7.0	Pennsylvania	25.0	18.0	Indiana	25.3	11.8
Indiana	58.5	37.0	Minnesota	6.0	6.0	NYU	24.0	22.0	Minnesota	24.8	18.2
Pennsylvania	50.2	42.5	Texas	5.0	5.0	Harvard	22.0	22.0	Columbia	24.3	20.4
Northwestern	48.8	39.4	UC Berkeley	4.5	4.5	Northwestern	19.8	16.8	NYU	24.2	19.0
NYU	48.2	41.0	Lyons	4.0	4.0	Stanford	15.0	13.0	Washington, U. of	24.0	18.0
Harvard	41.8	38.8	Stanford	3.0	3.0	Southern Calif.	13.5	8.0	Carnegie Mellon	22.7	18.0
Wisconsin	37.5	25.7	LSU	2.0	2.0	Michigan State	13.0	12.0	Florida	22.5	12.7
LSU	30.8	19.5	Nebraska	2.0	2.0	Missouri	11.0	10.0	Cornell	21.4	18.5
Washington, U. of	28.0	22.0	Southern Calif.	2.0	2.0	Iowa	10.0	7.3	Pennsylvania State	20.5	10.8
Missouri	27.5	20.3	Wisconsin	2.0	2.0	LSU	9.3	8.0	LSU	18.8	9.5
Cornell	25.9	22.0	Missouri	1.5	1.5	Nebraska	9.0	9.0	Northwestern	18.4	12.1
Florida	25.0	14.2	Brown	1.0	1.0	Yale	9.0	8.0	North Carolina	16.8	11.5
Southern Calif.	24.8	15.3	Cornell	1.0	1.0	MIT	7.0	7.0	Missouri	15.0	8.8
Carnegie Mellon	23.7	19.0	Georgia	1.0	1.0	Vienna	6.0	5.5	UCLA	14.2	11.2
Pennsylvania State	22.5	12.8	Iowa	1.0	1.0	Arizona	5.5	4.5	Purdue	14.1	10.8
Yale	21.0	20.0	Johns Hopkins	1.0	1.0	UCLA	5.5	5.0	Harvard	11.3	8.3
Iowa	20.8	15.3	Kansas	1.0	1.0	Oklahoma	5.0	4.0	Oklahoma	11.3	6.8
UCLA	19.7	16.2	Pennsylvania State	1.0	1.0	Wisconsin	5.0	5.0	Pennsylvania	11.2	10.5
North Carolina	19.3	14.0	0 (0) Schools	<1.0	1.0	Alabama	4.5	3.5	Alabama	10.7	2.3
Purdue	16.6	12.3				Sydney	4.5	4.5	Iowa	10.5	7.0
Oklahoma	16.3	10.9				Washington, U. of	4.0	4.0	Washington—St. Louis	10.2	7.8
†68 (54) Schools	<16.3	16.3				33 (32) Schools	<4.0	4.0	68 (52) Schools	<10.2	10.2

* Institutions in top ten overall and also in top twenty for each of three bidecade periods for all articles.

Institutions in top ten overall and in each of the three bidecade periods for all articles.

† Frequency of schools for main articles and notes in parentheses.

toral degree-granting institutions represented is:

	Number of Schools
1926–1945	27
1946–1965	63
1966–1985	88

This increase is likely related to the rising number of doctoral programs since the early 1940s.

Eight of the top ten schools overall (marked by an * in Table 4) appear in the top 20 for all three bi-decade periods. Only three schools (marked by a #) appear in the top ten for all three bi-decade periods and overall. Four schools appear in the top ten overall and the top 20 in each bi-decade for both affiliated institution (Table 3) and doctoral degree institution (Table 4). The University of Illinois and the University of Chicago are the only two schools that appear in the top ten for all time periods examined for both affiliated and doctoral degree-granting institutions. Only slight reordering occurs when comparing "main articles and notes" versus "all articles."

SUMMARY

The summary of authorship in *The Accounting Review* detailed above presents an interesting picture of the *AR*'s first 60 years. Because of its status as a premier journal, the individual authors cited in the tables include many important contributors to the accounting literature.

The compilation of institutional affiliation of authors by adjusted articles revealed that six schools appeared in the top 20 for all three bi-decades, indicating some institutional dominance. Also noted is that authorship by affiliates of non-academic institutions declined dramatically during the last 20-year period. Compiling authors according to where they obtained their doctorates evidenced eight institutions appearing in the top 20 for all three bi-decades.

No attempt has been made to assess the quality of articles or their contribution to the accounting literature, or to investigate other quality measures. Therefore, the orderings are not a definitive measure of accounting department, institution, or author quality. Instead, the orderings identify the most prolific contributors in the past and provide some indication of contributions one might expect to see in the future.

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A Framework for Triple-Entry Bookkeeping

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ABSTRACT: Building upon the author's earlier work [1982], which demonstrated that double-entry bookkeeping is not an absolute system defying extensions but is logically extendible to triple-entry bookkeeping, this paper develops a framework for a triple-entry bookkeeping system and illustrates it by means of a simple example which includes a worksheet, journal entries, and three basic financial statements—wealth statement, momentum statement, and force statement. While the earlier work extended the existing two dimensions of bookkeeping (wealth and income) into a third dimension under the same measurement unit, namely dollars, this present paper introduces "momentum accounting" under a related but different measurement unit, namely dollars per time period, such as a month, in such a way that, when mathematically integrated over time, momentum accounting articulates with wealth accounting in every dimension. Dealing with earnings rates per time period associated with assets and liabilities, momentum accounting accounts for earnings rates and their changes. Finally, "force accounting" is introduced as the third layer of the accounting system to explain factors that are judged to be responsible for changes in the earnings rate. Its measurement (dollars per month per month, for example) is induced by the measurement in momentum accounting, which in turn is induced by the measurement in wealth accounting. In this way, the extension of double-entry bookkeeping is carried out under a disciplined framework of measurements, which hopefully will direct management's attention and sensitivity to factors at a level deeper than the level of wealth and income that has been traditionally dealt with by double-entry bookkeeping.

An earlier monograph showed that double-entry bookkeeping is *not* an absolute system, defying any extensions, but is logically extendible to triple-entry bookkeeping by including a set of accounts called "force" in its third axis [Ijiri, 1982]. This paper discusses a framework under which details of triple-entry bookkeeping are now being developed and presents a simple example that illustrates the interrelationship among dimensions in triple-entry bookkeeping. Such an effort is of interest from a theoretical standpoint, enabling us to understand the double-entry bookkeeping system from a higher level of perspective. In addition, the new system appears to have practical feasibility, offering a basis

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under which some of the fundamental concepts in management accounting, especially those in variance analysis, can be extended and integrated with those of financial accounting.

WEALTH AND INCOME

The key to an extension of any system lies in understanding the logic behind the existing system. In particular, it is important to understand what single-entry bookkeeping was and what was added to it when the system was extended to double-entry. The conclusion on this issue, as elaborated in Ijiri [1982], is the following: Single-entry bookkeeping dealt with only stock accounts, such as assets and liabilities, while double-entry bookkeeping extended it to also include flow accounts, such as revenues and expenses, under an interlocking, articulated framework.[1,2]

The role of flow accounts in double-entry bookkeeping is to explain or to "account for" changes in the net balance in stock accounts based on the underlying causes that are considered to be responsible for the change. A double-entry equation,

$$\Delta Stock_n = Flow_n \qquad (1)$$

expresses the requirement that changes (denoted by Δ) in the net balance of stock accounts that occurred in period n be fully accounted for by a set of flow accounts in the same period. A change in the stock is an observed phenomenon; the flow explains why the change has happened.[3]

Once we understand that the salient feature of double-entry bookkeeping lies in the integration of flow accounts with stock accounts, its logical extension to triple-entry bookkeeping becomes clear, namely, it means an integration of a new set of accounts designed to explain changes in *flow* accounts.

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earlier monograph [1982] on triple-entry bookkeeping were most valuable, and to Jeffrey Rickman of Carnegie-Mellon University, whose comments on an earlier draft of this paper from the standpoint of mechanics were very helpful. The author is also indebted to the editor and two anonymous reviewers whose editorial comments and suggestions resulted in a marked improvement of the manuscript.

[1] The integration of income accounts in the bookkeeping framework made double-entry bookkeeping distinctly different from single-entry bookkeeping. See Littleton [1933, pp. 22–40], who emphasizes profit and loss and other nominal accounts as the indispensable component in double-entry bookkeeping. See also Pacioli's [1494] use of revenue and expense accounts and the Profit and Loss (*pro e danno*) account as a summary in the overall bookkeeping framework. The practice of double-entry bookkeeping, however, seems to have existed in Italy for more than a century before Pacioli's *Summa* was published: See, for example, Peragallo [1938] and deRoover [1956]. There are different views on the distinguishing feature of double-entry bookkeeping. See, for example, Yamey [1956, pp. 7–9] and Goldberg [1965, pp. 215–219]. For a more detailed discussion on the nature of double-entry bookkeeping in contrast to single-entry bookkeeping, see Ijiri [1982] and references therein.

[2] It is true that in double-entry bookkeeping, assets are recorded as debits, while liabilities (negative assets) are recorded as credits. Also, an asset increase is recorded as a debit, while its negation, an asset decrease, is recorded as a credit. The converse is true with a liability change. Such an expression of negativity by transposition, however, is not essential in double-entry bookkeeping, since nothing whatsoever is lost if all stock accounts (assets and liabilities as well as their changes) are recorded as debits and all flow accounts (revenues and expenses as well as their adjustments) are recorded as credits. It is interesting to note that at the time of Pacioli's [1494] publication, mathematicians did not recognize negative numbers as a full-fledged mathematical entity, which did not come about until nearly 1600 (see Kline [1972, p. 252]). As a result, Pacioli seems to have taken pains to avoid the use of negative numbers, using transposition to mean negativity (see Peters and Emery [1980]). Actually, in this age of personal computers, there is no reason to avoid the use of negative numbers, especially if by doing so a more homogeneous classification of accounts is achieved. However, without transposition it is possible to have journal entries, such as a purchase of inventories, in which all accounts are on the debit side and no accounts show up in the remaining columns. This is not a violation of the double-entry or triple-entry equation since all sides of the entry still add to the same number, zero.

[3] Using the terms in Hempel and Oppenheim [1948], $\Delta Stock_n$ is the "explanandum" which is explained by $Flow_n$ or the "explanans." For example, an enterprise owning only cash had a decrease in cash from $30,000 to $20,000. Why did it happen? Flow accounts, collectively

To comprehend what this extension means in the accounting environment, it is useful to translate stock and flow accounts into accounting terms, "wealth" and "income." Wealth is assets less liabilities. Income is revenues less expenses. There are other flow accounts such as contributions by owners or distributions to owners, as well as such flow accounts as purchases, collections, or payments, which do not normally give rise to a change in wealth. But since income-producing activities are the primary source of wealth change of interest, flow accounts other than income will be set aside for simplicity of illustration.

MOMENTUM, FORCE, AND IMPULSE

To extend the wealth-income dichotomy to a trichotomy, it is necessary to introduce the concept of "the rate at which wealth is changing," or equivalently "the rate at which income is being earned." The concept will be denoted by *momentum*. While both wealth and income are measured in monetary units such as dollars, momentum is measured in monetary units per period, such as dollars per year or per month. Unlike income, for which measurement requires specifying two points in time, momentum shows a state (of income being earned) at any single point in time. Income is then a realization of momentum as time passes.[4] Under a stable momentum, income is defined as momentum times "duration" of momentum.[5]

The concept of momentum is actually used in business, although normally the difference between momentum and income is not explicitly made. For example, when an executive says "this investment (or that division or that asset) is earning $60 million a year," what the executive refers to is momentum, not income.[6]

Because momentum may be defined and measured at any single point in time, it is conceivable to prepare a "balance sheet" in which all revenues and expenses are treated as stock accounts and measured in momentum. Such measurements may be based on a detailed analysis of asset and liability items in terms of their ability to contribute to the earning process. In this analysis, momentum for monetary assets and liabilities is easy to determine using the pertinent interest rate. For nonmonetary items, an analogy with the historical cost principle may be taken, and we may adopt what may be called the "historical momentum principle." Under this principle, the momentum of an item acquired is set equal to the momentum of an item given up in exchange, until the change in momentum is confirmed by realization, such as actual sale or lease or else a contract to sell or lease at a fixed price or rate.[7]

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adding to −\$10,000, explain the reason. The next step will be to treat the loss of \$10,000 as an explanundum and try to find its explanans.

[4] If wealth at time T is denoted by W_T, income between time T' and T is $W_T - W_{T'}$, while momentum is dW/dt evaluated at $t=T$.

[5] An investment of \$10,000 yielding interest at the rate of one percent per month has a momentum of \$100/mo. If the momentum is stable at this rate, its realization over a year (a one-year duration) will result in an income of \$1,200. In mechanics, momentum is defined as mass (m) times velocity (v). Analogously, in the accounting interpretation, momentum may be defined as investment times yield, e.g. \$100/mo = \$10,000 × 1%/mo.

[6] A car driven at 60 miles an hour at a given point in time may or may not go 60 miles in the next hour since the speed need not remain constant.

[7] The historical momentum principle implies appreciation or depreciation in book value at a constant rate, hence it conflicts with the historical cost principle which results in a constant book value. A translation of such methods as FIFO, LIFO, the lower-of-cost-or-market method, and various depreciation methods also generates a different result when applied to momentum compared with their application to wealth. Comparisons and reconciliations of the differences between accounting principles and standards as they are applied to wealth and as they are applied to momentum offer an interest-

Consider the fact that momentum itself changes over time. Just as the rate of change in wealth is measured in momentum, the rate of change in momentum must now be measured in another concept.[8] Because there is no such concept currently established in accounting, we may seek a concept in mechanics that fits in the definition. That is the concept of *force*. Force is measured as a rate of change in momentum. Hence, in the accounting interpretation, it is expressed in monetary units per period squared, such as dollars per month per month.[9]

Although both momentum and force are undoubtedly terms that are not familiar to accountants and managers, such an introduction of new terms is unavoidable in an extension of a system like double-entry bookkeeping. Fortunately, both terms have common-sense interpretations that fit very well with the technical meaning we are seeking.[10]

Since momentum shows a state at a given point in time, equation (1) may be applied to momentum, treating it as stock. Namely, we want to account for changes in the net balance of momentum by means of a set of accounts designed to express the reasons for the change in momentum. Here again, since there is no convenient term that currently exists in accounting to describe a set of such accounts, a comparable term in mechanics may be considered.

There are two requirements that the new concept must satisfy. Just as wealth and income are both in the same measurement unit, for example, dollars, momentum and this new concept must be in the same measurement unit, for example, dollars per month. Second, just as income is a realization of momentum and is measured by momentum times duration when the momentum is stable, the new concept is a realization of force and is measured by force times duration when the force is stable. A concept in mechanics that satisfies both requirements is called *impulse*.[11]

A FRAMEWORK FOR TRIPLE-ENTRY BOOKKEEPING

Table 1 shows the relationship among wealth, momentum, income, force, im-

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ing subject of study, enhancing our understanding of what these accounting principles and standards mean in a broader context.

[8] "Why did our momentum go down from \$5 million a month to \$4 million a month?" an executive may ask; "What are the contributing factors?" Often casual explanations are given in monthly management reports to the board of directors. We need to formalize the reasoning behind the attribution to various factors in the form of accounts.

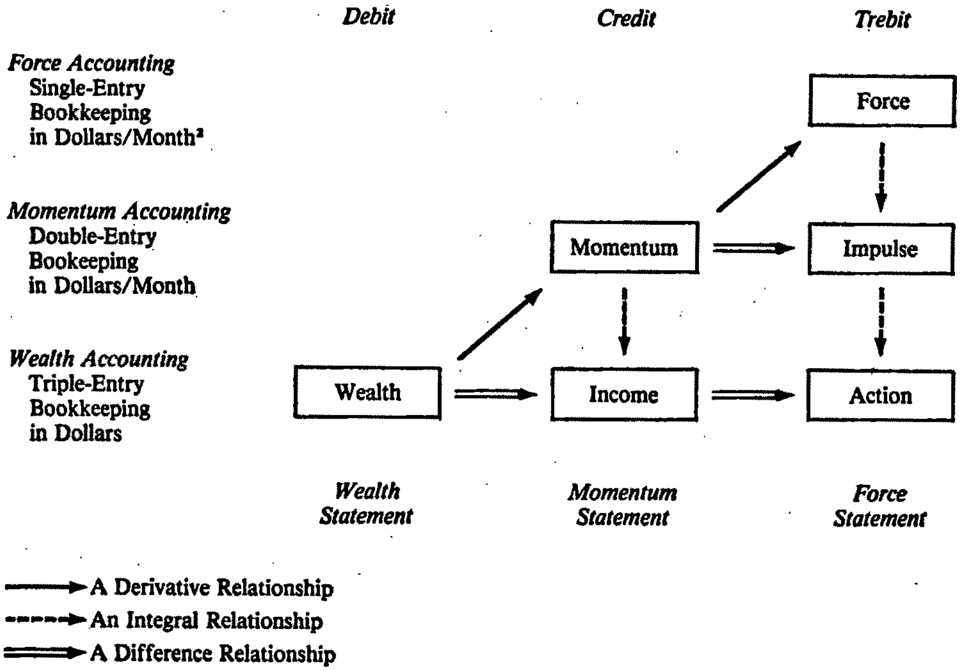
[9] In mechanics, force is defined as mass (*m*) times acceleration (*a*). In the accounting interpretation, force may be defined as investment times acceleration (rate of change in yield), e.g., $\$10/\text{mo}^2=\$10{,}000\times 0.1\%/\text{mo}^2$, namely the yield, stated as a fraction per month, increases by 0.1%/mo for each one-month duration of, say, an inflationary force. If wealth is W, momentum is M, and force is F, then $M=dW/dt$, and $F=dM/dt=d^2W/dt^2$. Here, the measurement of wealth is the primary measurement and the measurement of momentum and that of force are derived measurements. It has been observed, however, that the "best" measurement for one of the three need not be the "best" measurement for the remaining two. See Ijiri and Noel [1984] for a detailed discussion on the choice of measurement for each of the three dimensions, comparing the historical cost and the current cost measurements.

[10] Concepts and relationships among them in an original field must of course fit in nicely in the applied field; but it is also nice if the concepts and relationships are not inconsistent with their common-sense interpretations.

[11] In mechanics, impulse is measured as force times duration. It can also be shown that it is equivalent to mass times velocity, just as momentum is. Although in mechanics impulse is used in particular for situations where duration is short, in our accounting application we may apply it more generally, irrespective of the length of duration. For a detailed treatment of the concepts and measurements of momentum, force, and impulse in Newtonian mechanics, see, for example, French [1971]. The analogy with Newtonian mechanics should, however, be pursued only to obtain some valuable insights into how the triple-entry bookkeeping framework should be developed. A wholesale translation without regard to its applicability to accounting is dangerous, since after all, physics and accounting are two different fields of endeavor.

TABLE 1

A FRAMEWORK FOR TRIPLE-ENTRY BOOKKEEPING



pulse, and one more concept yet to be explained, namely action. On the bottom row of Table 1 we have the familiar two dimensions in wealth accounting, that is, wealth and income, setting aside the third dimension of action for now. The two dimensions are tied together by the difference relationship, ΔWealth = Income, both of which are stated in monetary units such as dollars.

We now move to the second row of Table 1, which expresses the double-entry equation (1) applied to momentum, namely ΔMomentum = Impulse. That is, changes in momentum at any two points in time are fully accounted for by impulse, whose accounts express the underlying forces that are judged to be responsible for the momentum change. Both momentum and impulse are stated in monetary units per period. This particular layer of accounting, called momentum accounting, is analogous to the conventional double-entry framework for wealth and income, except that the primary object of accounting is momentum instead of wealth.

The top row of Table 1 shows the dimension for force accounting. Its only dimension is force, which is stated in monetary units per period squared. While conceptually it is possible to define a concept that deals with a rate of change in force, a higher dimension is not considered at this time. (Such a concept will become necessary if the bookkeeping system needs to be further extended to quadruple-entry bookkeeping.) Hence, force accounting has to be based on a single-entry bookkeeping system.

Two types of relationships exist across

different layers of accounting. One is the derivative relationship that exists between wealth and momentum as well as between momentum and force. One deals with the rate of change in the other, and mathematically one is the time derivative of the other. This relationship is shown in Table 1 by diagonal arrows. The other is an integral realtionship connecting concepts vertically in Table 1, such as momentum-income and force-impulse (as well as impulse-action, which will be explained later). For a constant momentum or force, income is momentum times duration and impulse is force times duration, as mentioned earlier. More generally, income is measured as an integration of momentum, and impulse is measured as an integration of force, both over a given period of time.

The diagonal, derivative relationship and the vertical, integral relationship that tie wealth, momentum, and income are the converse of each other if the integration constant is set equal to the beginning balance of wealth. Hence, the equality holds between the wealth dimension and the income dimension when the beginning balance of wealth is added to the latter. Here, the horizontal relationship between wealth and income is a difference relationship, as against the derivative and integral relationships discussed above, since journal entries are made at discrete points in time to change wealth and income accounts.

The same triangular relationship may be observed among momentum, force, and impulse. The derivative relationship between momentum and force, the integral relationship between force and impulse, and the difference relationship between momentum and impulse are all analogous to their counterpart observed in the triangular relationship among wealth, momentum, and income.

One thing that should be emphasized in the vertical linkage of the three types of accounting (wealth, momentum, and force accounting) is the importance of the timing of momentum change in assessing its impact on wealth. In conventional wealth accounting, one dollar of income increases wealth by exactly one dollar regardless of when it is earned, if we set aside a compounding effect (one dollar's worth of wealth earned earlier in a period may contribute to further earnings during the rest of the period). In momentum accounting, a $1/month increase in momentum occurring at the beginning of a year yields a $12 increase in both wealth and income, again setting aside the compounding effect, while the same momentum increase occurring at the end of the year has a zero impact on this year's income.

Normally, an intraperiod timing difference in income recognition has no impact on the income for the period and on the ending wealth. Similarly, an intraperiod timing difference in impulse recognition (recognition of changes in momentum) has no impact on the impulse for the period and on the ending momentum, yet such a timing difference significantly affects the lower level concepts in Table 1, namely income for the period and ending wealth.

For this reason, in momentum and force accounting the timing of journal entries recognizing a change in momentum or force is as important as the amount of the entry. Such a sensitivity to timing of the change (another way of stating this is the duration of a given level of momentum or force) is a new element in accounting, observed in momentum and force accounting but not in conventional wealth accounting.[12]

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[12] The fact that the intraperiod timing difference in income recognition is not important in conventional wealth accounting does not mean that the underlying mathematical properties of wealth accounting are different from those of momentum or force accounting. They are all identical in terms of their mathematical

Now consider the third dimension in wealth accounting under a triple-entry bookkeeping system. Since ΔMomentum $=$Impulse, and momentum integrates to income, impulse should also integrate to something that ties in with income under a suitable selection of integration constants. We shall use the term "action" to designate such a concept that refers to the realization of impulse.[13] Action, therefore, shows an ultimate effect of force and is measured in monetary units just as wealth or income is. In addition, just as income requires beginning wealth as the integration constant to maintain the equality between the wealth dimension and the income dimension, action requires the same beginning wealth as the integration constant. But action requires something more. As stated before, the equality between the momentum dimension and impulse dimension can be maintained only after the beginning momentum is added as the integration constant. Hence, when the impulse is integrated along with the beginning momentum, the result shows a division of income in the current period into two components: (1) the portion of income that is a realization of the momentum that existed at the beginning, and (2) the portion of income that is generated as a result of various changes in the momentum during the period.

Thus, in the action dimension we have two integration constants: (1) the beginning wealth and (2) a realization of the beginning momentum. The difference between the ending wealth and the sum of these two constants is the contribution of forces exerted during the period, measured in terms of their impact on wealth that was realized during the period. Such current period contributions of forces are classified into various force accounts based on the types of forces that are judged to be responsible for the momentum change.

Reading Table 1 column-wise, the six dimensions of triple-entry bookkeeping may be divided into three categories: wealth in the first column (debit); momentum and income in the second column (credit); and force, impulse, and action in the third column (which we shall call "trebit").[14] Each category is summarized in the respective statement (wealth, momentum, and force statements), an example of which is shown later in Table 4. The wealth statement is similar to the assets and liabilities portion of the existing balance sheet. Its bottom line shows the net wealth at the end of the period, classified into various types of assets and liabilities.

The momentum statement has two columns, one for momentum and the other for income. In the momentum column, various revenues and expenses are stated in terms of their respective momentum evaluated at the end of the period. The income column is like the conventional income statement. It shows the realization of revenue and expense

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properties. It just so happens that the concept of an integral of wealth is not widely used in management, except in such areas as interest computations where the timing of deposits and withdrawals is important. In fact, an integral of wealth from the beginning to the end of a period gives rise to the notion of "wealth utilization" during the period, which may have important applications in the determination of the rate of return. (Currently most such needs are met by just taking the average of the beginning and the ending balances of assets or investment.) In such a measurement, an intraperiod timing difference in income recognition can become an important issue.

[13] In mechanics there does not seem to be any concept that specifically refers to the realization of impulse. The term "action" has been chosen here since it describes the managerial aspect of the relationship with wealth and income in the most concise manner, although unfortunately the term has already been used in mechanics to designate another, totally different, concept.

[14] Out of six letters in "trebit," four letters are in the same position as "debit" and also four letters are in the same position as "credit." Hence, the new term has not only a satisfactory connotation for the third column ("tre" for three and "bit" for piece) but also has phonetic consistency with the existing two terms.

momenta during the period along with the beginning balance of owners' equity accounts so that the sum of all items in this column equals the net wealth at the end of the period.

The force statement has three columns, the first one for force, the second one for impulse, and the third one for action. The force column shows the end-of-period balance of various force accounts that are in the process of affecting momentum. They are recorded under a single-entry system. The impulse column shows the impact on momentum of forces exerted during the period. When the beginning momentum is added to the sum of items in the impulse column, the total should agree with the ending momentum balance in the momentum statement. The action column shows the impact on wealth of various forces exerted during the period. The sum of this impact, beginning wealth, and the realization of the beginning momentum during the period equals the ending wealth.

Note that wealth accounting under a triple-entry bookkeeping system can be implemented without the higher-level structure such as momentum accounting and force accounting. After all, judgments on income and action can be made on a purely subjective basis if necessary. The super-structure placed on wealth accounting, however, puts discipline over such judgments and offers a "framework" to add logical strength to the wealth accounting system.

AN EXAMPLE

A simple example illustrating the basic relationship among the pertinent dimensions is now presented to provide some idea of the structure of the triple-entry bookkeeping system. After a brief discussion of transactions, a worksheet, journal entries, and financial statements are presented in Tables 2–4. In Table 5 a list of a variety of force accounts that may be used in triple-entry bookkeeping is provided. Many such items have been used in monthly management reports to the executives and the board of directors as well as in variance analysis of factory costs, describing why income or cost has gone up or down relative to the previous period or relative to the budget. Triple-entry bookkeeping makes such judgments by accountants an integral part of the bookkeeping system so that the judgments are carried out systematically, uniformly, and consistently.

XYZ Company engages in retailing of bottled mineral water, including deliveries. At the end of month zero, the company's assets are $30 in cash, $180 in receivables, and $340 in inventories, while its liabilities are $50 in payables (000's omitted.) There are no fixed asset accounts since the warehouse, the office building, and delivery trucks are all leased. The company's wealth at the end of month zero is, therefore, $500. (See the first row in Table 2.) In addition, as of the end of month zero, the company has a net momentum of $10/month, which is $100/mo in sales less $90/mo in expenses. The latter consists of $50/mo in cost of sales, $30/mo in operating expenses, and $10/mo in income taxes. (See the first column in Table 2.) Thus, in month one management inherits the enterprise legacy in the form of a $500 wealth and a $10/mo momentum.

At the beginning of month one, management plans to introduce a new product, carbonated mineral water. Management is most interested in knowing the impact of this action on momentum as well as on wealth. Also, management wants to keep an eye on three factors, namely (1) margin, (2) volume, and (3) efficiency of delivery workers, so that corrective actions may be taken immediately when they are needed. Margin is gross margin per unit of sales and volume is sales volume. In addition to these two key elements of operation, efficiency of delivery workers is an important factor, since it causes a significant fluctuation in the operating expense. The wage rate has been fixed by a union contract and is not expected to change in the near future. Other operating expenses are expected to be stable, and the tax rate is set at 50 percent.

In view of these factors in the management environment, it is decided to open four force accounts: New Product, Margin Variance, Volume Variance, and Efficiency Variance. Normally, there is a need for a miscellaneous force account which takes care of insignificant or unexplainable changes in momentum, but in this example, it is assumed that the above four accounts are sufficient. Since management's concern is after-tax figures, all force accounts are expressed in terms of their impact on the after-tax momentum and wealth.[15]

It is also decided to sequence force accounts in exactly the way in which they are shown in Table 2 so that any joint effects would be grouped together in the force account that appears earlier in the sequence. Hence, for example, all of the volume effect of new product introduction is included in the new product account so that the volume variance account shows only the impact of volume change in the old product. Similarly, the efficiency variance account shows the impact of labor usage after adjusting for the impact of the new product introduction and the volume change in the old product. One month has been selected as the basic time unit by which to measure momentum. The accounting period in this example is considered to be only two months long instead of a more standard 12 months.

Activities in month one are summarized on the top half of Table 2. It shows an increase in momentum from \$10/mo to \$15/mo, to a large extent due to the new product. For simplicity, it is assumed that all momentum changes occur at the beginning of each month. Table 2 also shows that the momentum and its change increased wealth by \$15 in month one. Activities in month two are likewise summarized in the same table. The bottom portion of the table summarizes the impact of force on momentum as well as on wealth. Table 3 shows a trial balance along with aggregate journal entries in each of the two months. Table 4 gives wealth, momentum, and force statements covering the two-month period. Table 5 provides examples of force accounts, classified by their types.

SUMMARY

In summary, this paper introduced three layers of accounting (wealth, momentum, and force), each with its own measurement unit (dollars, dollars per month, and dollars per month per month), which interlock with each other through the derivative/integral relationship. The third dimension of triple-entry bookkeeping has thus been developed not only at the dollar measurement level, which articulates with the conventional wealth and income dimensions, but also at the level of its first and second derivatives.

The conventional accounting identity, debit$\equiv$credit, is therefore extended "horizontally" along the same measurement unit to debit$\equiv$credit$\equiv$trebit; at the

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[15] Although margin, volume, and efficiency variances seem to have no direct relationship with forces or actions in management as such, they are used here because of their familiarity in cost accounting. As we gain more experience in dealing with force accounts, they may be regrouped to tie in more closely with specific managerial forces and actions as shown by examples in Table 5.

TABLE 2
WORKSHEET FOR WEALTH, MOMENTUM, AND FORCE

		Force Accounts					*Wealth Accounts*				
	Beginning Momentum	*New Prod.*	*Margin Var.*	*Volume Var.*	*Effic. Var.*	*Ending Momentum*	*Cash*	*Receivables*	*Inventories*	*Payables*	*Total Wealth*
Month 1											
Beginning Wealth							$30	$180	$340	-$50	$500
Income Accounts											
Sales	$100/mo	$20/mo	$12/mo	$8/mo		$140/mo	40	100			140
Cost of Sales	-50	-8	-10	-4		-72			-72		-72
Operating Expenses	-30	-4		-2	-$2/mo	-38				-38	-38
Income Taxes	-10	-4	-1	-1	1	-15				-15	-15
Net Income	$10/mo	$4/mo	$1/mo	$1/mo	-$1/mo	$15/mo					
Other Flow Accounts											
Purchases									80	-80	
Collections							90	-90			
Payments							-70			70	
Ending Wealth							$90	$190	$348	-$113	$515
Month 2											
Beginning Wealth							$90	$190	$348	-113	$515
Income Accounts											
Sales	$140/mo	$6/mo	-$8/mo	$12/mo		$150/mo	30	120			150
Cost of Sales	-72	-2	2	-6		-78			-78		-78
Operating Expenses	-38			-2	$4/mo	-36				-36	-36
Income Taxes	-15	-2	3	-2	-2	-18				-18	-18
Net Income	$15/mo	$2/mo	-$3/mo	$2/mo	$2/mo	$18/mo					
Other Flow Accounts											
Purchases									75	-75	
Collections							110	-110			
Payments							-122			122	
Ending Wealth							$108	$200	$345	-$120	$533

TABLE 2—(*Continued*)

Summary: Force (Ending Balance)		$\$2/\mathrm{mo}^2$	$-\$3/\mathrm{mo}^2$	$\$2/\mathrm{mo}^2$	$\$2/\mathrm{mo}^2$			
Impulse (Impact on Momentum)								
Month 1		$4/mo	$1/mo	$1/mo	-$1/mo			
Month 2		2	-3	2	2			
Total	$10/mo	$6/mo	-$2/mo	$3/mo	$1/mo	$18/mo		
Action (Impact on Wealth)								
Month 1	$10	$4	$1	$1	-$1	$15	Ending Wealth	$533
Month 2	$10	6	-2	3	1	18	Beginning Wealth	500
Total	$20	$10	-$1	$4	$0	$33	Net Increase	$33

All momentum changes are assumed to have occurred at the beginning of each month.

TABLE 3

TRIAL BALANCE AND JOURNAL ENTRIES

Debit *(Wealth)*		*Credit* *(Income)*		*Trebit* *(Action)*	
		Trial Balance at the End of Month 0			
Cash	$30	Beginning Wealth	$500	Beginning Wealth	$500
Receivables	180				
Inventories	340				
Payables	-50				
Total	$500	Total	$500	Total	$500
		Journal Entries in Month 1 (Total)			
				Beginning Momentum	$10
Cash	$60	Sales	$140	New Product	4
Receivables	10	Cost of Sales	-72	Margin Variance	1
Inventories	8	Operating Expenses	-38	Volume Variance	1
Payables	-63	Income Taxes	-15	Efficiency Variance	-1
Total	$15	Total	$15	Total	$15
		Journal Entries in Month 2 (Total)			
				Beginning Momentum	$10
Cash	$18	Sales	$150	New Product	6
Receivables	10	Cost of Sales	-78	Margin Variance	-2
Inventories	-3	Operating Expenses	-36	Volume Variance	3
Payables	-7	Income Taxes	-18	Efficiency Variance	1
Total	$18	Total	$18	Total	$18
		Trial Balance at the End of Month 2			
		Beginning Wealth	$500	Beginning Wealth	$500
				Beginning Momentum	20
Cash	$108	Sales	290	New Product	10
Receivables	200	Cost of Sales	-150	Margin Variance	-1
Inventories	345	Operating Expenses	-74	Volume Variance	4
Payables	-120	Income Taxes	-33	Efficiency Variance	0
Total	$533	Total	$533	Total	$533

same time a new accounting identity is introduced to link measurements "vertically" along the derivative/integral relationship using the fact that rate of change times duration of the rate equals the amount of change.

In this way, the extension of double-entry bookkeeping to triple-entry bookkeeping is carried out under a disciplined framework of measurements, which hopefully will direct management's attention and sensitivity to factors at a level deeper than the level of wealth and income that has been traditionally dealt with by double-entry accounting.

TABLE 4
WEALTH, MOMENTUM, AND FORCE STATEMENTS

Wealth Statement

Wealth Accounts	*Wealth Ending Balance*
Cash	\$108
Receivables	200
Inventories	345
Payables	–120
Total	\$533

Momentum Statement

Momentum Accounts	*Momentum: Ending Balance*	*Income: Impact on Wealth*
Sales	\$150/mo	\$290
Cost of Sales	–78	–150
Operating Expenses	–36	–74
Income Taxes	–18	–33
Total	\$18/mo	\$33
Beginning Wealth		500
Ending Wealth		\$533

Force Statement

Force Accounts	*Force: Ending Balance*	*Impulse: Impact on Momentum*	*Action: Impact on Wealth*
New Product	$\$2/\text{mo}^2$	\$6/mo	\$10
Margin Variance	–3	–2	–1
Volume Variance	2	3	4
Efficiency Variance	2	1	0
Total	$\$3/\text{mo}^2$	\$8/mo	\$13
Beginning Momentum		10	20
Ending Momentum		\$18/mo	
Net Income			\$33
Beginning Wealth			500
Ending Wealth			\$533

TABLE 5
EXAMPLES OF FORCE ACCOUNTS

A. Internal Forces

1. *Investment Forces*
   - a. Acquisitions
   - b. Plant Openings
   - c. Plant Expansions
   - d. Securities Investments
2. *Divestment Forces*
   - a. Segment Disposals
   - b. Plant Closings
   - c. Product Discontinuance
   - d. Inventory Clearance
3. *R&D Forces*
   - a. R&D Discoveries
   - b. Patent Licensing
   - c. Product Development
   - d. Process Development
   - e. Mineral Discoveries
4. *Labor Forces*
   - a. Hiring
   - b. Firing
   - c. Training
   - d. Strikes
   - e. Productivity
   - f. Wage Rates
5. *Production Forces*
   - a. Process Improvements
   - b. Product Qualtiy Changes
   - c. Crash Production
   - d. Industrial Accidents
   - e. Contaminations
   - f. Spoilage
   - g. Stockouts
6. *Marketing Forces*
   - a. New Product Campaigns
   - b. Advertising Campaigns
   - c. Price Changes
   - d. Market Research
   - e. Designs and Packaging
7. *Financing Forces*
   - a. Borrowing
   - b. Refunding
   - c. Stock Issues
   - d. Stock Retirements
   - e. Conversions
   - f. Debt Restructuring
   - g. Hedging

B. External Forces

8. *Competitive Forces*
   - a. Competitors' New Products
   - b. Competitors' New Services
   - c. Competitors' Promotions
   - d. Price Wars
9. *Economic Forces*
   - a. Seasonal
   - b. Cyclical
   - c. Growth Trend
   - d. Inflation Rate
   - e. Unemployment Rate
10. *Governmental Forces*
    - a. Tax Reforms
    - b. Subsidies
    - c. Interest Rates
    - d. Product Safety Control
    - e. Environmental Controal
    - f. Zoning and Permits
    - g. Consent Decrees
11. *International Forces*
    - a. Wars
    - b. Nationalization
    - c. Embargoes
    - d. Currency Restrictions
    - e. Quotas
    - f. Import Duties
    - g. Foreign Exchange Rates
    - h. Foreign Interest Rates
    - i. Foreign Inflation Rates
12. *Natural Forces*
    - a. Earthquakes
    - b. Tornadoes
    - c. Hurricane
    - d. Severe Weather
    - e. Lightning

C. Residual Forces

13. *Unattributed Forces*
    - a. Price Variance
    - b. Quantity Variance
    - c. Volume Variance
    - d. Spending Variance
    - e. Efficiency Variance
    - f. Miscellaneous

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FINANCIAL REPORTING

M. Edgar Barrett, Editor

The Phantom Federal Income Taxes of General Dynamics Corporation

James E. Wheeler and Edmund Outslay

ABSTRACT: This article reviews and evaluates the financial reporting of the federal income taxes of General Dynamics Corporation. Such a review illustrates the material discrepancies that can result between book income and tax return income using generally accepted accounting principles. It also raises doubts as to (1) the relevance of the current disclosure of "effective tax rates" in the income tax note to the financial statements, and (2) whether General Dynamics has fully reported its tax status in its annual reports. We believe that the FASB should require a more complete articulation of a corporation's tax status in its annual reports.

A *New York Times* article [Gerth, Feb. 1, 1985, p. 27] revealed that General Dynamics Corporation had not paid any federal income taxes since 1972.[1] In addition, the article stated that between the period 1979–1983 the company had paid shareholders more than $200 million in dividends, none of which were taxable as ordinary income to the recipients. While confirming that the dividends were indeed tax-free, a spokesperson for General Dynamics refused to comment on the company's tax situation, stating that "we feel that our tax status has been reported fully in our annual reports."

This article reviews and evaluates the financial reporting of the federal income taxes of General Dynamics Corporation (GDC). It exposes several important measurement and disclosure issues that, while especially applicable to GDC, are relevant to other companies as well. In particular, the analysis illustrates the

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[1] This analysis of GDC's financial reporting of its federal income taxes was substantially completed, except for the data from the 1984 Annual Report, well before the *New York Times* article appeared. The extreme nature of GDC's book and tax disparities was uncovered in a search of the Compustat tapes as part of another research project.

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material discrepancies that can result between book income and tax return income using generally accepted accounting principles (GAAP). It also raises doubts about (1) the relevance of the current disclosure of "effective tax rates" in the income tax note to the financial statements and (2) whether GDC's tax status "has been reported fully in our annual reports."

This paper is organized as follows: first, the federal income taxes of General Dynamics for the years 1973–1984 are analyzed in detail; second, the propriety of its income tax disclosures is discussed in light of current practices; and finally, the issues raised by the GDC situation are examined relative to the ongoing controversy over the problems of accounting for and reporting federal income taxes.

THE REPORTED FEDERAL INCOME TAXES OF GDC, 1973–1984

An analysis of GDC's annual reports from 1973–84 indicates that the company reported positive net income per books in each year except 1978. Consistent with the comprehensive interperiod tax allocation requirements of APB No. 11, the Company also reported a positive federal income tax expense in each year other than 1978. Over this time period, cumulative pre-tax book earnings totaled \$2.709 billion and cumulative federal income tax expense totaled \$1.005 billion, as shown in Table 1.

Over the identical 12-year period, however, General Dynamics actually paid no federal income taxes and accumulated a net operating loss carryforward for tax purposes at the end of 1983 of \$3.1 billion (Col. 3 of Table 1).[2] Then, in a sudden turnabout, this NOL carryforward was reduced by over \$2 billion to \$957 million in 1984 alone. The cumulative difference between GDC's book income and tax return income, which over the 1973–83 period exceeds \$5.1 billion, is dramatically depicted in Figure 1. This divergence between financial and tax reporting is most apparent in 1983, when book income exceeded estimated tax return income by \$1.145 billion, and in 1984, where estimated tax return income before the NOL deduction exceeded book income by \$1.459 billion.

Reconciling the Disparity Between GDC's Book and Tax Return Incomes

The principal cause of the enormous difference between GDC's book and taxable income is the company's use of the completed contract method for tax purposes while the percentage of completion method is used for financial reporting (the completed contract method generally is not permissible for financial reporting in GDC's case [AICPA, 1981, para. 25]).

Under the completed contract method, the company defers recognition of gross profit on the contract as taxable income until the contract is "complete" [Reg. Sec. 1.451-3(d)(1)]. Prior to changes made in the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), a "contract," in the case of a manufacturer of defense hardware such as GDC, included all orders for a particular product from both domestic and international sources. As long as GDC could obtain worldwide orders for a particular model of fighter plane, it apparently considered the contracts *not* to be completed. Thus the contracts were kept

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[2] GDC actually paid \$68.4 million in federal income taxes during 1973–75, but this was refunded in 1976 due to a net operating loss (NOL) carryback. In addition, the GDC loss carryforward of \$3.1 billion to 1984 is, to our knowledge, the largest reported NOL carryforward in U.S. corporate history. It exceeds by \$1 billion the NOL carryforward reported by the Chrysler Corporation in 1980.

TABLE 1

THE BOOK AND TAX RETURN RESULTS OF GENERAL DYNAMICS CORPORATION, 1973–1984
(ALL DOLLAR AMOUNTS IN MILLIONS)

Calendar Year (1)	Earnings <Losses> Before Minority Interest and Income Taxes (2)	Estimated Federal Taxable Inc Before NOL Deduction (3)	Excess <Deficit> of Book Income Over Tax Return Income[##] (4)	Tax Provision (5)	Federal Income Taxes Paid <Refunded> (6)	"Effective" Tax Rate per GAAP (7)
1973	$ 66.1	$		$ 24.7]		37.4%
1974	92.9	142.5[#]	$ 153.3	34.6]	$68.4	37.2
1975	136.8			47.7]		34.9
1976	161.8	<142.5>	304.3	53.3	<68.4>	33.2
1977	188.9	<241.0>	429.9	79.3	0	42.0
1978	<151.2>[@]	<348.0>	196.8	<107.2>	0	n/a
1979	296.2	<255.0>	551.2	104.9	0	35.4[**]
1980	258.6	<337.5>	596.1	62.1	0	24.0[**]
1981	196.2	<636.5>	832.7	72.1	0[*]	36.7[**]
1982	269.3[@@]	<646.0>	915.3	108.8	0[*]	40.4[**]
1983	509.7	<636.0>	1,145.7	223.1	0	43.8[**]
Subtotal	$2,025.3	$<3,100.0>	$ 5,125.3	$ 703.4	0	
1984	683.6	2,143.0	<1,459.4>	301.9	0	44.2[**]
Totals	$2,708.9	$ <957.0>	$ 3,665.9	$1,005.3	0	

[@] This loss was solely the result of an extraordinary write-off on GDC's nuclear submarine contracts.

[@@] This amount excludes a $52 million before-tax loss from discontinued operations.

[#] The $68.4 million refund per the 1976 financial report divided by the 48 percent corporate tax rate in the refund years equals $142.5 million of estimated taxable income for years 1973 through 1975 aggregated.

[##] The yearly amounts in this column can be viewed as the total of the permanent and timing differences for each year.

[*] This ignores the $46.4 million received in 1981 and 1982 from the sale of tax benefits under the Safe Harbor Leasing provisions.

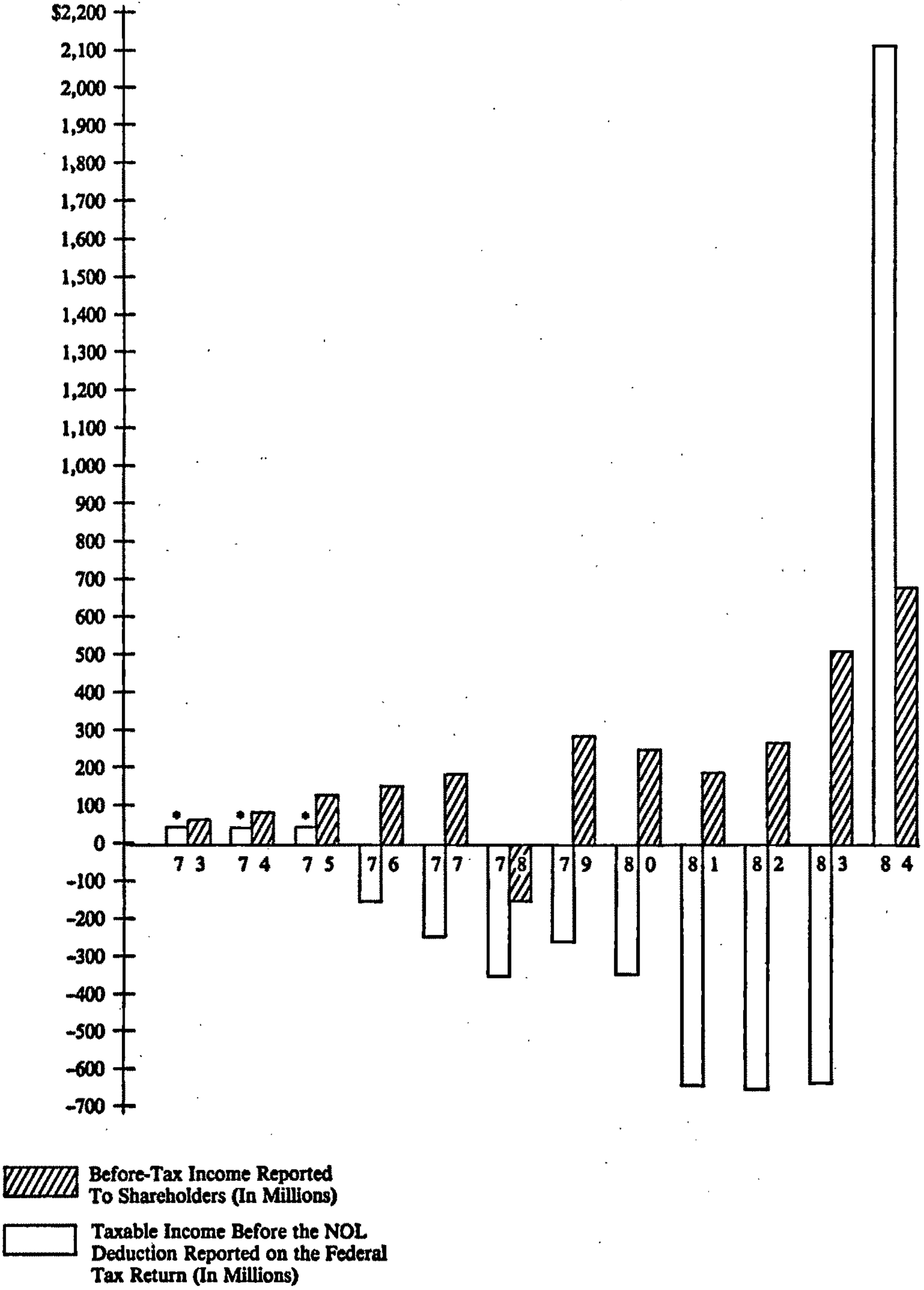
[**] As shown in the annual report to shareholders. GDC first began showing what they label as their "effective tax rate" in 1980; the rates were then shown for both 1979 and 1980. The amounts in the final column for years prior to 1979 were computed by dividing the tax provision column amounts by the amounts shown in the before tax book earnings column.

"open" and all gross profit on the product was deferred until such time that no more orders were received and all back orders were filled. Such "contracts" could be extended almost indefinitely.

In TEFRA Congress attempted to limit the "contract's" life by defining a single contract as an order for a product that is to be independently priced and separately delivered. Theoretically, this would treat each domestic and foreign order for a similar product as a separate contract. The effect of the changes, because they are limited to new contracts after December 31, 1982, is not evident in GDC's tax position. GDC's management letter in the 1982 Annual Report [p. 38] stated that:

> Congress has significantly reduced the benefits of tax deferrals resulting from the use of the completed contract method of accounting for taxable years ending after 31 December 1982. While the Corporation does not anticipate any

FIGURE 1
TWO MEASUREMENTS OF THE SAME DAY-TO-DAY BUSINESS TRANSACTIONS OF GENERAL DYNAMICS CORPORATION



* The taxable income for 1973, 1974, and 1975 totaled approximately $142.5 million (see Table 1); this has been split into thirds for this chart.

> significant cash impact in 1983, it cannot determine the impact in subsequent years until interpretive regulations are issued. [This was not even mentioned in the 1983 Annual Report even with the enormous decrease in the NOL carryforward occurring in 1984.]

The availability of the completed contract method was extended to General Dynamics Corporation and other defense contractors in 1976 through the issuance of Treasury regulations. Prior to 1976, GDC recognized revenue for income tax purposes upon delivery. In its 1975 annual report [p. 25], the Company stated that:

> For tax purposes, sales and earnings under certain major U.S. Government contracts and programs are reported as deliveries are made; whereas for financial reporting purposes, sales and earnings are accounted for using the percentage-of-completion methods.

The use of the delivery method for tax purposes produced differences between GDC's book and taxable income, but the magnitude of the differences was relatively small compared to current differences, and the income measures were both of the same sign. As shown in Table 1 (Col. 3), we estimate that tax return income for 1973–75 totaled $142.5 million, whereas book income totaled $295.8 million (Col. 2). The income tax provision for 1973 through 1975 totaled $107 million while federal income taxes actually paid were $68.4 million.

When General Dynamics Corporation changed to the completed contract method in 1976, it stated the following in its 1976 annual report [p. 25]:

> Effective 1 January 1976, the corporation changed, with the permission of the Internal Revenue Service, to the completed contract method for reporting taxable earnings on long-term contracts. Under this method, substantial amounts of earnings recognized for financial reporting purposes are deferred for Federal income tax purposes. In addition, substantial costs including general and administrative, state and local income taxes and certain fringe benefits, applicable to long-term contracts, are deducted currently under the completed contract method. [The current deduction of related overhead was permitted even though these overhead charges are reimbursed on a monthly basis by the Federal Government. The reimbursement, however, was treated as deferred revenue for tax purposes.]

While the completed contract method allows postponement of revenue, it also theoretically requires postponement of the related cost of goods sold. In those relatively few cases in which this method can be used for financial reporting, a case can also be made for deferring some of the selling and administrative costs [see FASB, 1985, p. 69, para. 10]. GDC made no such deferral for tax purposes and, in 1983, the resulting NOL was $636 million while the "selling, and general and administrative" expenses were $408.3 million. It appears that for 1983, GDC deducted about $227.7 million ($636−$408.3) of cost of sales in excess of any revenue recognized.

Tax Carryforwards: GDC's NOLs and ITCs

As Table 1 shows, the 1976 change in the income tax regulations immediately permitted GDC to report operating losses for tax purposes. The 1976 NOL resulted in a $68.4 million refund of federal income taxes presumably paid in years 1973, 1974, and 1975.[3] From

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[3] It is quite possible that the NOL carryback freed up some ITCs that may then have been carried back to years 1970, 1971, or 1972 in obtaining the $68.4 million refund.

TABLE 2

GENERAL DYNAMICS CORPORATION'S NOLs AND TOTAL ASSETS
(ALL DOLLAR AMOUNTS IN MILLIONS)

Calendar Year	*Taxable Income**	*Aggregate NOL Carried Forward*	*Total Assets*	*Assets in Excess of NOL Carryforwards*
1973	$ 142.5	0	$ 599	$ 599
1974		0	717	717
1975		0	788	788
1976	<142.5>	0	861	861
1977	<241.0>	$ <241>	1,601	1,360
1978	<348.0>	<589>	1,779	1,190
1979	<255.0>	<844>	2,005	1,161
1980	<337.5>	<1,181.5>	2,436	1,254.5
1981	<636.5>	<1,818>	2,327	509
1982	<646.0>	<2,464>	2,640	176
1983	<636.0>	<3,100>	2,836	<264>
Subtotal	$<3,100.0>			
1984	2,143.0	<957>	3,035	2,078
Total	$ <957.0>			

* These amounts represent estimated taxable income before the NOL deduction and are from Table 1.

1976 through 1983, GDC consistently reported large NOLS and thus has paid no federal income tax net of refunds from 1972 through 1984.[4]

Net operating losses incurred after 1975 for tax purposes must be used within 15 years of their incurrence or their tax benefit will expire. In the case of General Dynamics, its tax NOL carryforwards to 1984 begin to expire in 1992. Of more immediate concern to GDC, however, is the potential expiration of its investment credit carryforwards. As of the end of 1984, GDC reported ITC carryforwards of $165.1 million, which will begin to expire in 1990. Since GDC must use all of its $3.1 billion NOL carryforward to 1984 *before* it can use any of its ITC carryforwards, the Company must generate at least $3.1 billion of taxable income by 1990 or it will lose part of its ITC carryforward. A major step was taken in that direction by "consuming" $2.143 billion of the $3.1 billion NOL carryforward in 1984. Now only the 1983 and part of the 1982 NOLs remain—making up the $957 million NOL carryforward—thereby pushing back the expiration date to 1998 and 1999.

ESTIMATING GDC'S TAX BASIS BALANCE SHEET

The magnitude of the losses reported for tax purposes can be brought into better perspective when they are compared to the total assets of GDC. This is shown in Table 2.

While reported total assets might normally be considered to be the upper bound on any accumulation of losses, it

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[4] In addition, GDC received $46.4 million from the sale of tax benefits in 1981 and 1982 under the Safe Harbor Leasing provisions. For a discussion of these provisions, see Stickney, Weil, and Wolfson [1983].

TABLE 3

GENERAL DYNAMICS CORPORATION ESTIMATED TAX BASIS BALANCE SHEET AS OF DECEMBER 31, 1983 (AMOUNTS IN MILLIONS)

Assets	$2,836.2	Current liabilities		$ 903.0
		Other liab. (672.6−546.5 deferred tax)		126.1
		Deferred gross profit		4,962.9•
		Total liabilities		$ 5,992.0
		Common stock	$ 80.1	
		Treasury stock	<135.9>	
		Paid-in capital		<55.8>
		Retained earnings assumed equal to NOL carryforward		<3,100.0>•
		Total owners' equity		$<3,155.8>
Total assets	$2,836.2	Total liab. & capital		$ 2,836.2

• All amounts, other than the deferred gross profit and the tax basis retained earnings (the NOL), are as shown in the financial accounting balance sheet at December 31, 1983. The deferred gross profit equals book retained earnings ($1,316.4) plus deferred taxes ($546.5) plus the NOL carryforward ($3,100) = $4,962.9. It should be noted that this deferred gross profit has substantially been received by GDC in the form of progress payments.

must be remembered that the tax benefit of the net-operating loss carryforward is not usually recorded as an asset. NOL carryforwards are first used in financial reporting to draw down existing deferred tax credits.

If the financial reporting bases and tax bases of the assets were the same at their acquisition dates, then the tax basis balance sheet of General Dynamics might appear as shown in Table 3 at December 31, 1983.

Because the NOL of $3.1 billion exceeds total assets, there is a negative shareholders' equity and the liabilities (including deferred gross profit) are 211 percent of total assets. The negative paid-in capital is caused by treasury stock acquisitions in 1983 and not by the tax reporting of General Dynamics. (In 1984, $557 million more was spent to acquire treasury shares and this stock retirement program continued into 1985.)

GDC'S BALANCE SHEET AND INCOME STATEMENT PRESENTATION

Accounting for NOLs

The current accounting treatment of net operating losses under APB 11 [AICPA, 1967] has received considerable attention in the renewed debate over accounting for income taxes. In the most frequent case, the argument centers on whether the future tax benefits of an NOL should be recorded as an asset in the year the NOL arises or be deferred until the benefit is received. (See Elliott and Swieringa [1985] for a discussion of this issue.) For most companies, the existence of a current year tax loss coincides with reduced book earnings or a current year book operating loss. In the General Dynamics case, however, the current year tax losses (prior to 1984) occurred when record operating profits were reported to shareholders.

The accounting for NOL carryforwards is made even more complex when there are deferred tax credits already on the books at the time the carryforward arises. APB 11 [AICPA, 1967], paragraph 48, requires that if the tax benefit of an NOL carryforward is not recognized in the year it arises, the company must draw down (eliminate) deferred tax credits by the smaller of (1) the potential tax benefits of the NOL carryforward or (2) the amount of the net deferred tax credits (deferred tax credits less deferred tax charges) that would turn around (on an individual item basis) in the carryforward period of the NOL. In some cases, the drawn-down credits arose from the timing differences that created the NOL. If the NOL is used in a later period, the drawn-down deferred tax credits must be reinstated to the extent that they would not have turned around.

To illustrate, assume *P* Corporation had an unused NOL carryforward of $50,000 from the year 1984, for both book and tax purposes (i.e., no timing or permanent differences). Also assume the company had previously recorded net deferred tax credits of $30,000. Assuming a 46 percent tax rate, the NOL would generate a $23,000 tax savings when realized. Under APB 11, *P* Corporation would be required to offset the implicit tax benefits from the NOL against its deferred tax credits by the lesser of $23,000 or $30,000. This would be recorded as follows:

Deferred tax credit	23,000	
Federal Income Tax Provision		23,000

When book income is positive and taxable income is negative, the recording of the NOL benefit becomes more complex, depending on whether the company is certain or uncertain of its use of the NOL. If a company is uncertain of the future realization of its tax benefit and has net deferred tax credits that would turn around in the carryforward periods, the company should disclose the drawn-down deferred tax credits.

GDC's Accounting for Its NOLs

On the 1983 General Dynamics balance sheet, there appears a liability for "future" but currently deferred taxes in the amount of $546.5 million (without any discounting). Apparently, this amount is not in excess of the cumulative 11-year (1973 through 1983) tax provision of $703.4 million due to adjustments other than tax payments. With a $5.125 billion difference between pretax financial income and tax return income, the deferred tax credits (ignoring any draw-downs) should be approximately $2.36 billion ($5.125 billion × 46%). In GDC's 1983 annual report [p. 30], the note on income taxes states:

> The Corporation has a net operating loss carryforward of $3,100.0 [in millions] expiring in various amounts from 1992 through 1998. Investment tax credits of $149.2 [in millions] have reduced deferred income taxes and will expire in varying amounts beginning in taxable years after 1989.

This quote clearly states that the ITC carryforwards have reduced deferred taxes. In journal entry form with years 1973–1983 aggregated, the draw-down of deferred tax credits because of the ITC carryforwards would appear as follows:

Deferred tax credits	149.2	
Federal income tax provision		149.2
Draw-down of deferred tax credits from timing differences for unused ITCs under the flow-through method.		

It should be noted that this recognizes the ITC for financial reporting as a reduction in the tax provision under the flow-through method even though these same ITCs may expire unused for tax purposes. In addition, the implications of the NOLs are not clearly presented in the prior quote. Since NOLs, as deductions, come *before* investment tax credits in computing the income tax liability, they should reduce the deferred tax credit amount *before the ITC is applied.* But such is not stated in the quoted note to the financial statements. It should be realized that NOLs often result from a combination of both permanent and timing differences. In the absence of permanent differences and with a positive before-tax book income, the draw-down of deferred tax credits for NOLs should merely offset their own originating deferred tax credits. Thus, in these cases, deferred taxes are only *recorded* for the differences between pretax book income and a positive (or zero) tax return income. However, all timing differences and their sources should be disclosed in the income tax footnote.

If the GDC deferred tax amount has been drawn down by the NOLs as well as by the $149.2 million of ITCs, the total deferred tax amount (timing differences ×46%) in the 1983 Annual Report should be $2,121.7 million without the draw-downs. This figure is the sum of the recorded $546.5 million plus the $149.2 million of ITCs plus $3,100 million of NOLs times 46 percent ($1,426 million).

To ascertain whether the NOLs have reduced deferred tax credits, we can examine the recording of the $636 million increase in NOLs in 1983. The formula in Table 4 can be used to reconcile the difference between before-tax book net income and tax return income.

General Dynamics Corporation reported before-tax earnings of $509.7 million in its 1983 annual report to its shareholders. The difference between tax return income (a $636 million loss) and the before-tax book income (a $509.7 million profit) is $1,145.7 million. This amount should be reflected as either timing or permanent differences in the income tax note to the financial statements.

The above analysis illustrates that the unreported GDC timing differences are equal to the increase in the NOL carryforward. General Dynamics Corporation has "recorded" the draw-down of the deferred tax credits for NOL carryforwards by merely not reporting the related deferred credits in the first place. There is no way of knowing the source of the unreported timing differences or when they might turn around. For example, were the unreported differences due to long-term contracts or to other items such as depreciation or installment sales?

GDC's Reporting of Its NOL

General Dynamics Corporation reported deferred taxes in the tax provision for 1983 of $243.4 million as follows [1983 Annual Report Note F]:

Completed contract method:	
Earnings on uncompleted contracts	$230.1
Transitional adjustments	14.6
Other	(1.3)
	$243.4

In reporting the 1983 tax provision [1983 Annual Report Note F] GDC shows the following:

Tax provision at current tax rates on book income:	
Current	$ (2.1)
Deferred	243.4
Tax Credits—deferred	(11.9)
Depletion allowances in excess of cost depletion—deferred	(4.8)
Permanent deferral of DISC income	(1.5)
Provision for income taxes	$223.1

Since General Dynamics Corporation used the same technique to "report" the effect of each year's increase in the NOL carryforward, the unreported (and undisclosed) timing differences total approximately $1.426 billion (the $3.1 billion NOL times a 46 percent corporate tax rate). These timing differences would then be drawn down by $1.426 billion—the tax effect of the NOL carryforward—and they would reverse in 15 years. But what are the sources of these timing differences? Are they due to long-term contracts or other items? If the NOL is due to long-term contract timing differences, the $230.1 million increase in deferred taxes for 1983 should be $522.7 million [$230.1+(46%×$636)], and then the $292.6 million ($636×46%) draw-down for the 1983 increase in the NOL carryforward could be shown.

The disclosure in the GDC 1984 Annual Report regarding the NOL is as follows [p. 30]:

	Year Ended 31 December		
	1984	*1983*	*1982*
Provision:			
Completed contract method	$ (774.5)	$ 460.6	$ 407.0
Other	39.4	6.4	50.8
	$ (735.1)	$ 467.0	$ 457.8
Tax effect of net operating loss carryforward utilized (generated)	1,053.4	(230.4)	(334.6)
	$ 318.3	$ 236.6	$ 123.2
Cumulative deferred income taxes	$ 852.2	$ 546.5	$ 321.3

The Corporation has net operating loss carryforwards of $957.0 which if not used will expire in 1998 and 1999.

It should be noted that the amounts for the completed contract method (CCM) reported in 1984 for years 1983 and 1982 vary significantly from those shown in the 1983 and 1982 Annual Reports.

	1983	*1982*
CCM (per 1984 Annual Report)	$406.6	$407.0
CCM (per 1983 and 1982 Annual Reports)	230.1	96.0
Amounts unreported in 1983 and 1982	$176.5	$311.0

The tax effect of the "utilized" NOL, the reduction in the NOL from $3.1 billion in 1983 to $957 million in 1984 ($2.143 billion), was reportedly $1,053.4 million. This implies that the NOL prevented taxes at the rate of 49.16 percent from being assessed ($2,143 ×49.16%=$1,053.4) whereas the top tax rate would be only 46 percent (48 percent for years prior to 1979). The "utilization" does, however, point out the fact that there have been unreported timing differences of considerable magnitude in the GDC financial statements for many years, some of which have not yet been reported.

With NOLs expiring, if unused, in 1998 and 1999, and considering the 15-year carryforward, the NOLs for GDC must be from years 1982 and 1983, respectively ($636 million in 1983 and

TABLE 4

RECONCILIATION OF BEFORE-TAX BOOK NET INCOME AND TAX RETURN INCOME

		GDC 1983 Data
	Before-Tax Book Net Income	$ 509.7
Plus or minus	Permanent differences (differences between the revenue and expense items in (1) before tax book net income or in (2) tax return income where only one of these two items is ever impacted).	— 20.3*
Equals	The Book Equivalent of Tax Return Income	$ 530.0
Plus or minus	*Recorded* timing differences (differences between the revenue and expense items entering into (1) before tax book net income and into (2) tax return income in different years).	— <530.0>**
Equals	A Positive or Zero Tax Return Income	—
Plus or minus	*Unrecorded* timing differences	<636.0>#
Equals	A Negative Tax Return Income	$<636.0>

* This amount consists of $11.9 deferred tax credits + $4.8 depletion + $1.5 DISC + a negative current provision of $2.1; thus these are not all permanent differences.

** The recorded timing differences of $243.4 divided by 46% = $529.1 million with the difference due to rounding.

# Unrecorded current year timing differences drawn down; note that recorded and unrecorded timing differences total $1.166 billion ($530 + $636) for 1983 and not the reported $530 million.

TABLE 5

GENERAL DYNAMICS CORPORATION'S DISTRIBUTIONS TO ITS SHAREHOLDERS AND RELATED DATA (ALL DOLLAR AMOUNTS IN MILLIONS)

Year	*Dividend Payments**	*Before Tax Net Earnings#*	*Retained Earnings End of Year*	*Current Year NOL#*	*Cumulative NOL#*
1973–1978	$ -0-	$ 495.3	$ 628.1		$ <589>
1979	34.4	296.2	778.6	$<255>	$ <844>
1980	36.3	258.6	937.2	<337.5>	<1,181.5>
1981	41.3	196.2	1,020.0	<636.5>	<1,818>
1982	41.1	269.3	1,111.7	<646>	<2,464>
1983	52.2	509.7	1,316.4	<636>	<3,100>
Subtotals	$205.3	$2,025.3			
1984	43.8	683.6	1,644.6	2,143##	<957>
Totals	$249.1	$2,708.9			

* During the 12-year period covered by this article, dividends were paid only in years 1979 through 1984.

# Data from Table 1.

## NOL carryforward used in 1984.

$957−$636=$311 of the 1982 NOL unused). This implies that $2.143 billion of NOLs have been "consumed" in 1984 because of completion of contracts. The only mention of any contracts closing in 1984 comes in Management's Discussion and Analysis of the Results of Operations and Financial Condition (p. 34), where it is stated that "operating earnings in 1982 were reduced by $83.9 [million] on the initial two SSN 688-class contracts [submarines] completed in 1984." There is no other discussion in the annual report as to any contracts having closed.

This raises the question as to whether GDC is closing contracts rather arbitrarily so as not to lose the ITCs that begin expiring after 1989 or whether the company decided not to pursue the aggressive tax posture that it had been pursuing, thus changing its accounting method for tax purposes. In either situation, the IRS could argue that the $2.143 billion adjustment should be spread over prior tax years. If this were done, via amended returns, the prior $200 million in tax-free dividends mentioned in the introduction (and discussed more fully later in this article) could become taxable.[5] It seems very unlikely that GDC would be closing so many contracts that it would go from reporting over $630 million in tax losses in each of the prior three years to suddenly reporting a positive taxable income in 1984 of $2.143 billion before the NOL carryforward. But since this is the case being reported, certainly the shareholders and potential investors should have been given much more information than that contained in the 1984 Annual Report. The sudden and enormous change in tax status in which a $2.143 billion NOL carryforward is consumed should be fully explained. This raises doubts as to whether GDC's tax status has been reported fully in its annual reports as claimed.

GDC's Effective Tax Rate Presentation

The presentation of an "effective" tax rate as required by Accounting Series Release No. 149 (ASR No. 149) [SEC, 1973] has long been criticized as inappropriate and misleading as a measure of a firm's tax burden (see, for example, Stickney [1979a] and Fiekowsky [1977]). Under ASR No. 149, a company's "effective tax rate" is defined to be the income tax expense (per books) divided by book income before taxes. Accordingly, General Dynamics has reported effective tax rates ranging from 24 percent to 44.2 percent during the period 1973-1984 (see Table 1, Col. 7). In actuality, of course, GDC has *paid* zero federal income taxes during this time period and very modest amounts of state and local income taxes. One can only marvel at how comprehensive income tax allocation can portray a company that has not paid any federal income taxes for 12 years (net of refunds) as having "effectively" paid out almost one-third of its income to the government.

There have been numerous attempts to convert the financial accounting "effective tax rate" to a more realistic measure of the effect of the tax laws on a company's tax burden (see, for example, Fullerton [1984]; Joint Committee on Taxation [1983]; Fiekowsky [1977]; and Stickney [1979b]). However, due to the fact that GDC has reported an increase in its NOL carryforward for every year from 1977 through 1983, it can safely be assumed that tax return income for the company each year was negative. From a federal income tax standpoint, then, GDC's effective tax rate for each year of this period has been zero.

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[5] The tax status of these dividends would depend on whether the statute of limitations (three-year or six-year) had expired on the shareholders' previously filed tax returns.

Foreign and State and Local Income Taxes

With respect to state and foreign income taxes, only in 1980 did General Dynamics Corporation disclose any significant detail concerning current tax payments to both state and foreign governments. The 1980 disclosure, however, covered the years 1978, 1979, and 1980. For example, of the total provision of $104.9 million in 1979, only $7.8 million (less than ten percent) was listed as current, and this entire amount was paid to foreign governments (see GDC's 1980 Annual Report, p. 44). It is ironic that the largest defense contractor in the United States pays more foreign income taxes than U.S. federal income tax. The existence of foreign tax payments or accruals indicates that, in addition to its NOLs and ITCs, GDC has the potential to trigger some undisclosed amount of unused foreign tax credits for the purpose of reducing any future U.S. federal income tax on recognized foreign earnings.

The Tax Status of GDC's Dividend Payments

Without further investigation, one might suppose that, with record earnings of over $500 million reported in 1983 and with retained earnings of $1,316 million at December 31, 1983, the General Dynamics Corporation dividends would be taxable to shareholders. With over $3 billion in NOLs, however, GDC's "earnings and profits" (E&P) account—the tax measurement that determines the taxability of corporate distributions—is negative. Thus, GDC distributions to its shareholders were reported as tax-free returns of capital (IRS Sec. 301 (c)) prior to 1984. These distributions would be taxed as long-term capital gains once the basis of the stock in the hands of the shareholders is totally recovered. A return of capital distribution is deemed to be out of paid-in capital (both par value and additional paid-in). Table 5 shows the distributions by year along with the before-tax net earnings, the retained earnings, and the NOLs reported for tax purposes.

While GDC makes no mention of the tax-free status of its dividend distributions in its annual reports, many companies (see, for example, American Electric Power) do report the tax-free nature of their dividend distributions. In GDC's case, this information was obtained from Standard and Poor's *Dividend Record*.

It should also be noted that, beginning with contracts entered into after September 30, 1984, "taxpayers" such as General Dynamics will no longer be able to use the completed contract method for purposes of computing the current year's E&P account [Code Sec. 312(n)(7)]. Congress amended Code Section 312 in the 1984 Tax Reform Act to require that corporations using the completed contract method in determining taxable income must use the percentage of completion method in computing E&P. The stated purpose of this change was to make E&P conform more to "economic income" (one must wonder why tax return income is also not subject to the same standard). The effect of this tax law change on the tax status of GDC's dividends remains to be seen, however, because corporations apparently can continue to use the completed contract method for E&P purposes on contracts entered into before October 1, 1984. Notwithstanding the enormous taxable income before the NOL deduction ($2.143 billion) in 1984, it is quite conceivable that the losses from pre-October 31, 1984 contracts will exceed the gross profit from subsequent contracts for many years to come, thus continuing the nondividend status of future distributions.

CONCLUSIONS AND RECOMMENDATIONS

It is coincidental that GDC's financial reporting of its federal income taxes should come under public scrutiny at a time when the subject of accounting for income taxes is under reconsideration by the FASB. The problems encountered in accounting for net operating losses are very apparent when one analyzes GDC's financial presentation of its federal income taxes. In addition, the GDC presentation is a vivid reminder that the calculation of a company's "effective" tax rate required by ASR No. 149 can produce results that do not reflect economic reality.

GDC publicly claims that its "tax status has been reported fully in our annual reports." Our analysis raises serious concern about the accuracy of that statement, at least as it applies to all but the most sophisticated readers of financial statements.

This is an indictment not just against GDC but also against some of the current accounting practices in the reporting of income taxes. Commentators on current practice (see, for example, Stickney [1979b] and Wheeler and Galliart [1974]) have long recognized that current articulation rules could benefit from substantial revision. The GDC case is no exception. While this is not to suggest that a company be required to disclose tax return information in its financial statements, it is to suggest that the FASB should require a more detailed presentation of a company's sources of permanent and timing differences and the expected year(s) of reversal.

The FASB has a difficult problem in its evaluation of accounting for income taxes. Comprehensive income tax allocation, even though it has stood the test of time, fails in many instances to adequately reflect a company's economic position. Such will continue to be the case as long as the federal income tax system provides companies with the opportunities to exclude or indefinitely defer the recognition of significant amounts of their economic income.

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BOOK REVIEWS

Harvey S. Hendrickson, Editor

EDITOR'S NOTE: Books for review should be sent to Professor Richard P. Brief, 520 Tisch Hall, College of Business and Public Administration, New York University, New York, NY 10003.

(The policy of the *Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.)

PHILIP L. DEFLIESE, HENRY R. JAENICKE, JERRY D. SULLIVAN, and RICHARD A. GNOSPELIUS, *Montgomery's Auditing*, Tenth Edition, College Version (New York: John Wiley & Sons, 1984, pp. xxxi, 1179, $38.00).

JERRY D. SULLIVAN, RICHARD A. GNOSPELIUS, PHILIP L. DEFLIESE, and HENRY R. JAENICKE, *Montgomery's Auditing*, Tenth Edition (New York: A Ronald Press Publication, John Wiley & Sons, 1985, pp. xl, 1426, $68.00).

The College Version of this classic is a thoroughly contemporary, solidly competitive entry in the audit textbook market; it is only the third such version (the first since 1923) to be published. Like the Tenth Edition of its parent (the professional reference version), it is based on the fundamental relationships among financial statement assertions, specific audit objectives, and specific internal control objectives. The College Version preceded its parent volume on the market and is an adaptation "tailored to the needs of college courses . . ." (p. ix). The parent volume appears to have been completely revised and expanded by more than 50 percent from the ninth edition (reviewed April 1977, pp. 543–545).

Major portions of the college and reference versions are essentially the same. However, coverage in the parent volume is broader. It includes an additional section (Part 5) that has over 300 pages devoted to auditing in specialized industries (e.g., banking, construction, and health care) which do not appear in the College Version. It also covers audit aspects of generally accepted accounting principles in much more detail than the corresponding treatment in the College Version.

An instructor's manual is available for the College Version. It contains solid solutions for the questions, problems, and cases appearing at the end of each chapter in the text. Otherwise the instructor's manual is lean in scope, but contains a test bank and some proforma course syllabi that may be especially useful upon first adoption.

One of the cases in the College Version (Quinn Hardware) is pedagogically intriguing. It is a comprehensive and realistic audit case that continues in serial form in five widely separated chapters. In Chapter 6 the student must cope with special audit risk and the need for adequate information on the character of the client enterprise. In subsequent episodes the student is exposed to decisions about control evaluation and reliance as well as decisions about audit strategy for particular risk areas (including tax accruals). The case concludes in Chapter 25 where the student encounters decisions about presentation and disclosure in the auditor's report. This case includes exposure to the relationships among basic documents commonly associated with a voucher system. For the first course in auditing, this case can be a satisfactory replacement for a previously employed independent, comprehensive practice case.

Except as described above, the Tenth Edition and its College Version are substantially equivalent in their organization and presentation of (1) the role and structure of auditing; (2) the audit process together with supporting theory and methods; and (3) the execution of an audit. As expected, given the lineage of these volumes, they are devoted almost exclusively to attestation. Those searching for ways to enrich coverage of internal, operational, or performance auditing will need to look elsewhere.

The legal liability section is well organized, and effectively and cohesively summarized in a master chart that compares several salient features of common law and the Securities Acts of 1933 and 1934. The ethics coverage of auditor independence could benefit from a similar comparative analysis of the AICPA Code of Ethics and SEC releases that cover the philosophies and that give guidance for particular fact situations.

The chapters on extent of testing and statistical sampling are clear and solidly related to SAS 39. The approach to compliance testing strategy is tied to a specific taxonomy of control objectives that the authors relate to SAS Section 320. This rather unique taxonomy is reconciled with the financial statement assertions of SAS 31. This reconciliation then is used to explain the strategic relationships between compliance results and the subsequent selection, extent, and timing of substantive tests.

Specific audit applications are organized and explained using a modified transaction cycles approach. Those covered include the revenue, buying, and production cycles. However, accounts that the authors believe often might be audited most efficiently by relying solely on substantive tests are treated in stand-alone chapters which follow a more traditional balance sheet approach. For example, cash receipts and cash disbursements procedures are covered extensively in a chapter on cash. These two types of transactions are treated less extensively in the revenue and buying cycle chapters.

Even the College Version is longer than most auditing textbooks. Much of this is due to the richness of the treatments of specific applications rather than to breadth of coverage. For example, the revenue cycle chapter is enriched by discussions not only of potential impact on audit strategy of the special risks which might be related to consignment sales, fixed payments revenue, production payments, and gifts or donations, but also of deferred income and long-term contracts. These discussions demonstrate how the auditor might vary the emphasis among alternative tests in response to various special circumstances. A separate chapter dealing with tax accruals also is a welcome and practical enrichment not found in many basic texts.

These two publications provide a conservative, thorough, current, and contemporary treatment of auditing from an attest perspective. They should quickly earn acceptance and be recognized as enhancing the already high regard in which *Montgomery's Auditing* is held.

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Michael Grobstein, Stephen E. Loeb, and Robert D. Neary, *Auditing: A Risk Analysis Approach* (Homewood: Richard D. Irwin, Inc., 1985, pp. xviii, 803, $34.95).

Most auditing texts use one of two major approaches to the study of internal control and substantive testing. These are the balance sheet and the transaction cycle approaches. The title of this text suggests that a new approach based on risk analysis has been developed. In reality, an approach using "operating components" is presented, with risk analysis as a pervasive dimension. This is an application of SAS 47, "Audit Risk and Materiality in Conducting an Audit"; the profession's recognition of the risk dimension. This dimension can be integrated into either of the two major approaches mentioned earlier.

This textbook is significantly different from its more traditional predecessor, *Auditing Theory and Practice*, third edition, 1983 (reviewed October 1984, p. 720), that also was coauthored by Professor Loeb. The other coauthors on that book are acknowledged in the preface.

The new text presents the study of internal control and evidence gathering in an operating components format. The authors identify four components: sales, production or service, finance, and administrative. All evidence is gathered by component. Thus, the study of some accounts (e.g., cash or accounts receivable) will be divided among the components; partitioning of the coverage requires those trained in the other approaches to devote some time to thinking and adapting. It also creates problems for students. In response to a poll, students indicated they had substantial difficulty learning the audit method as presented. They considered the text material to be "vague" because of the partitioning of coverage. Once learned, however, the clerical problems of consolidating bits of evidence into the working papers and internal control review are the only difficult areas. The clerical problem is minor; the internal control problem is more serious. But this apparent weakness can be alleviated by making the accounting systems class a prerequisite to auditing.

The text has excellent problems, a majority of which are AICPA-adapted. It also is easy to read, with many direct quotes and references to the Auditing Standards. All of the normal auditing topics are presented. The book has good first course coverage of audit sampling and EDP in auditing and excellent coverage of planning considerations. Illustrations are very good and the appendices are well done. Another deficiency noted was that the lack of a sample program makes the chapter on audit programs difficult to visualize. Adopters should consider providing such a sample for students.

The text is interesting and unique. It should encourage teachers and other authors to integrate risk analysis into their coverage of the other auditing approaches. The text is acceptable for a first course in auditing with either a conceptual or a procedural orientation since it has elements of both.

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STANLEY D. HALPER, GLENN C. DAVIS, P. JARLATH O'NEIL-DUNNE, and PAMELA R. PFAU, *Handbook of EDP Auditing* (Boston: Warren, Gorham & Lamont, Inc., 1985, pp. xxxvi, 1112, $84.00).

The 32 chapters of EDP auditing concepts and practices drawn from the innovative Computer Audit Assistance Group of Coopers & Lybrand provide an excellent resource for EDP audit and other information system (IS) professionals. Academics, however, may need to resequence and augment the content for classroom use. The authors' perspective emphasizes financial auditing. Thus, some additional operational EDP audit material is necessary to prepare for the CIA and CISA examinations. Although this book is lengthy, the detailed table of contents and index enable efficient access to topics of interest.

As a rather comprehensive reference for practitioners, the handbook provides appropriate coverage of the EDP audit process, internal control evaluation, data and physical security, and both control objectives and mechanisms for system development, data center operations, and applications. Audit objectives and procedures for these areas also are discussed. A section on EDP audit techniques for compliance and substantive testing is included. One of this book's strengths is the inclusion of checklist and questionnaire material to illustrate the concepts presented. An extensive glossary and a bibliography provide additional guidance.

The material is well written and supported by ample illustrations, industry-specific examples, and commercial software features. For an individual less experienced with computerized financial systems, sufficient and easily understood descriptions of computer concepts (including microcomputers), system development, computer operations, and most accounting systems are included. The control-oriented flowcharting, interviewing, and transaction walk-through material will be valuable. The more seasoned practitioner will benefit from the well articulated discussion of the control analysis methodology. Some attention is devoted to the organization of the EDP audit function and the relationship between internal, external, and EDP auditors.

The coverage of financial systems addresses the general ledger and the typical subsystems within the revenue, expenditure, and production cycles. Supplemental material will be required for record retention requirements and for the investments, fixed assets, budgeting, personnel, and debt-equity systems. Internal EDP auditors with an operational audit interest also will need supplemental references for information system planning, budgeting, capacity planning, charge-out, CAD/CAM, office systems, insurance, and IS performance evaluation. Managers of an EDP audit function may need additional material on planning, scheduling, budgeting, career pathing, skills enhancement, and performance appraisal for their staff. The supplemental coverage, however, should not overshadow the excellent material on auditing computer-based financial systems which represents the major mission of most EDP audit groups.

Subsequent to the completion of this book in this era of rapid technological change, additional material on local area networks, multi-user micros, information centers, decision support systems, fourth-generation languages, computer-assisted software engineering tools, and structured development methodologies should be considered by EDP auditors.

For students and less experienced EDP auditors, the organization of the content, even with the extensive index, may create some access difficulties. For example, the system development area processes, controls, and audit procedures are distributed across six chapters, including some non-obvious locations. Similarly, the application systems' specific processes, control objectives, and audit programs are contained in two noncontiguous chapters. Application input-update-maintenance controls, compliance and substantive tests, and EDP audit techniques all appear in separate chapters. For formal academic and professional education use, instructors may choose to create (1) selected topics meta-indices and (2) matrices which relate application processes, control objectives and mechanisms, and EDP audit programs and techniques. The experienced EDP audit professional, however, should be able to locate relevant material without difficulty.

This handbook contains a wealth of excellent EDP audit concepts and practices. The absence of questions, exercises, and cases for each chapter, however, would require additional instructor-prepared material. This volume would be a valuable library reference for a college EDP audit course, internal and external EDP audit professionals, and information system staff.

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WILLIAM H. HOFFMAN, JR., and EUGENE WILLIS, Editors, *West's Federal Taxation: Comprehensive Volume, 1986 Annual Edition* (St. Paul: West Publishing Co., 1985, pp. xxx, 1201, $36.95).

WILLIAM H. HOFFMAN, JR., and EUGENE WILLIS, Editors, *West's Federal Taxation: Individual Income Taxes, 1986 Annual Edition* (St. Paul: West Publishing Co., 1985, pp. xxv, 1128, $32.95).

These texts are intended for introductory courses in federal taxation. The *Comprehensive Volume* is an abridged version of *West's Federal Taxation: Individual Income Taxes* and *West's Federal Taxation: Corporations, Partnerships, Estates and Trusts*. As such, it provides broad coverage for those who offer only one course in federal taxation. Its breadth is such that the instructor has a great deal of flexibility in structuring such a course. The *Individual Income Taxes* volume, by contrast, is intended for a first course in federal taxation for undergraduate and law students. Both texts are written in a prose style with extensive references within the paragraphs and in footnotes. This format, which attempts to combine the benefits of prose and reference style tax texts, has contributed to the success of the West series since its inception in 1977.

These 1986 annual editions from West may be regarded as unique in one sense. They are *not* accompanied by a supplement to make them current and reflect the latest tax law changes. In recent years most tax texts have been obsolete by the time they reached the classroom. Indeed, part of West's success may be attributed to the excellence of their supplements in response to tax law changes.

The entire West package is comprehensive. In addition to the usual study guide, instructor's guide, and solutions manual, several other supplements are available. New for 1986 is the *CPAids Tax Planner* software. This item, which is not a subject of this review, reflects a trend by accounting textbook publishers to provide microcomputer software which demonstrates changes under alternative treatments (in this case, tax planning alternatives). Neither text has assignments specifically designed for *CPAids Tax Planner*. (Reviews of tax software may be found in the *Journal of the American Taxation Association*, commencing with the Spring 1985 issue.) To round out its package, West offers a book of tax forms, a volume of selected federal statutes and regulations, and *CPAids Master Tax Program*. The latter is tax preparation software made available to West's adopters. It may be used to solve the comprehensive problems, as an alternative to the manual approach.

Both texts are written by the same 12 contributing authors. The end product gives no evidence of this collaborative effort; the chapters follow strict style guidelines. Each is preceded by a chapter outline and a list of objectives. Following this, and comprising the bulk of each chapter, is the main text. Here, material is introduced and discussed with numerous short, numbered examples (typically about 40 per chapter). The text portion of each chapter concludes with a "Tax Planning Considerations" section which reinforces one's mastery by emphasizing how the material relates to practice. The chapters conclude with question and problem assignment material. While most problems are brief, also included are some cumulative tax-form and tax-research problems. The appendices of each text also include a selection of tax-return problems. The quantity of the written coverage and assignment material is adequate. Many adopters will feel obligated to do some pruning. Since these texts are both broad and rigorous, complete coverage of either in a one-semester course would be a stern test for all concerned.

Although these texts have substantial coverage, some may wish to see more material on international taxation or tax administration (the latter *is* in the *Comprehensive Volume*); but most needs are met. These texts have been designed to be flexible; this enables a wide spectrum of adopters to develop a unique course. For instance, the extensive footnotes are particularly important to those who wish to emphasize the tax research possibilities in an introductory course. The appendix of tax forms and the inclusion of tax-form and return problems enable others to feature tax compliance. Finally, the end-of-chapter tax planning material allows others to focus on decision-making.

The faults in these texts to a certain extent are generic. Where is the humor? Accounting authors tend to adopt a reverent tone toward taxation. Law school authors stray, and their approach can be refreshing. Some of the coverage is awkward; particularly, the discussions of alimony and charitable contributions limitations. More study aids in the form of flowcharts, formulas, and worksheets should be included. The 1986 edition's "concept summaries" are a welcome step in this direction. Income averaging can be explained easily with two simple formulas, but the authors persist in repeating the tedious step approach from Form 1040, Schedule G. More effort needs to be made to integrate computers into the assignments. The text and the solutions manual have errors. Many of these are caused by recent changes in areas such as alimony, contributions ceilings, and business use of passenger cars, but this does not excuse them.

On balance, these texts follow a proven pattern that will probably suit a wide range of tastes. They continue to merit the serious consideration of tax educators.

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DANIEL L. JENSEN, Editor, *Information Systems in Accounting Education* (Columbus: The Ohio State University, 1985, pp. xiii, 253, free upon request).

Surely the major curriculum issue of the 1980s is the impact of developments in information systems thought and computer technology on the teaching and practice of accounting. This paperback reports the results of a conference on this issue held at The Ohio State University in November 1984.

The book is organized around five papers given at the conference, four of which deal with the impact of changes in information systems ideas and computer hardware and software on a specific area of the accounting curriculum (intermediate accounting, cost accounting, auditing, and taxation). The fifth paper discusses information systems technology and the financial data collection process. Also included are two "overview" papers which are respectively two and five pages long, the latter including two full-page charts.

The motivating idea for the conference was to stimulate discussion and debate on the challenges to accounting education presented by the emergence of information systems as a field of study. To encourage "cooperative thinking" in addressing these problems, teams of two or three authors with varying backgrounds were commissioned to write and present each of the curriculum papers. In addition, three respondents were assigned to each paper—one practicing accountant (industry or public accounting), one accounting educator, and one systems educator—to prepare written critiques and raise discussion points on the main paper. Following each main paper and its three critiques, a summary of the discussion by conference participants is presented.

The topic certainly is appropriate for a conference of this type and the structure of author and respondent teams was innovative and provided promise for an exciting and lively exploration of the issues involved. However, this promise goes largely unfulfilled. The main papers range from mostly descriptive (here is what we do at our school) to analytical (what is wrong with the way we currently teach accounting), but generally do not effectively confront many of the critical problems or decisions faced by accounting educators, or offer realistic and workable solutions to even those curriculum challenges that are raised. The discussion papers, with just a few exceptions, and the participant comments that follow just do not reflect the vigorous debate that should occur among educators when provocative curriculum issues such as these are considered. The two overview papers (one placed in the middle of the volume and one at the end) did not succeed in focusing thinking on the issues or in capturing the essence of the conference topics.

While the book raises some interesting points throughout and at least starts grappling with the curriculum challenge of our time, the volume probably will not reach its goal of stimulating critical thinking among accounting educators about this fundamental issue. In his preface, the editor states: "It must be admitted that the papers and discussions presented here do a much better job of revealing problems than of identifying solutions" (p. x). Most who read this book will wholeheartedly agree.

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J. KLAASSEN and P. VERBURG, Editors, *Replacement Costs for Managerial Purposes* (Amsterdam and New York: Elsevier Science Publishers, 1984, pp. xv, 227, $44.50).

Since several Dutch companies have led the way in replacement cost accounting, it is not surprising that a workshop on this topic was held in the Netherlands. This collection of 10 papers presented at the workshop covered the question of managerial use of replacement cost from a variety of perspectives including economic analysis, analysis of the results of Statement of Financial Accounting Standard No. 33, and the problems of indices. The research method is traditional deductive.

Some of the papers were modified after the conference, and probably reflect concerns expressed in the sessions. A six-page summary of additional points from the conference discussion is presented at the end of the book.

Nine of the authors are professors—seven are European, one is from the U.S., one is Israeli, and one is a scientist at the Central Bureau of Statistics in the Netherlands. Five other participants were practitioners.

Professor Klaassen's introduction states: "It should be stressed at the outset that this book does not aim at promoting current replacement cost theory or practice, but that the project was undertaken to bring together a unique international group of specialists from both academia and practice for an exchange of views to assess the current 'state of the art' and to explore the strengths and weaknesses of competing approaches to the problem of usefulness of several valuation bases under inflationary conditions" (p. xi).

Two papers discuss the issue from the perspective of microeconomics. Two others discuss replacement costs and control issues. Two consider pricing issues. Other papers consider equally diverse aspects of the application of management accounting.

Eight of the ten papers contain bibliographies, but not all bibliographic references are in English. All eight bibliographies cite earlier papers by the same author, indicating that the presenters have had a continuing interest in the subject.

The book probably is a useful addition to libraries. Its price will be prohibitive for most individuals. Most undergraduate students and practitioners will find the reading effort required greater than the benefit. Graduate students wishing exposure to deductive literature on this important topic will find the book useful. The brief summary of discussion at the end includes a few comments from the practitioners present at the workshop; the book's value would have been increased if more extensive practitioner reactions could have been included.

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CHARLES F. PHILLIPS, JR., ***The Regulation of Public Utilities: Theory and Practice*** **(Arlington: Public Utilities Reports, Inc., 1984, pp. xiii, 812, $40.00).**

This book is a thorough treatise on public utility regulation. It is not a typical classroom text, however, because it has none of the normal questions and problems at the end of each chapter and has no study guide, test banks, or instructor's manual. The book is well suited for business managers seeking an in-depth history and analysis of regulatory policy in general as well as regulation of specific industries. It would make a fine addition as a library reference (over 800 cases and 1,000 names are indexed) and could be used by teachers, students, and others specializing in utility regulation.

The text is intended to detail the development of economic regulation. It also is intended to include "extensive quotations from the growing volume of research on those issues [in the public utility sector] and comprehensive footnotes . . ." (p. vii). The author succeeds in this. However, the text has an over-abundance of quotes from and descriptions of landmark rate cases and Supreme Court decisions, especially for those whose interest is in the accounting or financial aspects of regulation. In Chapter 3, for example, the author describes the public interest concept in five pages and then requires 27 pages to review judicial opinions. Who really cares about the Wolff Packing Company vs. Court of Industrial Relations case (Kansas, 1923) or the New State Ice Company vs. Liebmann case (Oklahoma, 1925)?

The economic concepts presented in Chapter 2 are well done, and only slightly overdone for one whose interest lies in accounting and finance. Economics students will find the discussion of demand in monopoly versus competitive industries (and all the appropriate micro-economic curves) to be beneficial. Additionally, many parts of Chapter 5 are essential, such as the revenue requirement standard in regulation which is described well in less than two pages. In contrast, the author devotes ten pages (including 18 footnotes) of Chapter 5 to a description of the adjudicatory provisions of the Federal Administrative Procedure Act; this is somewhat overwhelming.

For accounting and finance students, the essence of the material starts in Chapter 6. Topics properly include regulation of accounting procedures, development of a uniform system of accounts, taxes, regulation of capital structure, rate base issues, rate-of-return models, and regulation of rate structure. From a financial perspective, more detail could have been devoted to cost of capital, financial planning, bond interest coverage, and security valuation of regulated firms.

Each of the latter chapters is devoted to discussions of regulation within the electric power, gas, telecommunications, and water industries. Even these chapters, however, are inundated with excessive references to rate and Supreme Court cases.

Overall, the book was a bit disappointing because of its lack of depth in the accounting and finance aspects of regulation. On the other hand, it is such a fine treatise on the history of regulation that it should be on the shelves of every accounting library and of every student and practitioner of regulated industries.

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LARRY GENE POINTER and RICHARD G. SCHROEDER, *An Introduction to the Securities and Exchange Commission* (Plano: Business Publications, Inc., 1986, pp. vii, 116, $14.95 paper).

Most undergraduate and many graduate students come to our courses with little or no knowledge of SEC regulation of public companies. For these students Chapters 2, 3, and 4 of this book should provide a non-technical, easy-to-follow overview of the major elements of SEC regulation of public companies. The material includes brief discussions of the accounting and accountants' parts of SEC regulations. However, the bulk of the material in these two chapters surveys the responsibilities, under SEC regulations, of company officers, directors, and all the outsiders who are involved with public companies. It is this whole-team orientation that I find especially useful. Most of the material about SEC regulation appearing in accounting texts discusses only the accounting and accountants' rules. Material like that appearing in this text is necessary if our students are to understand and prepare for their roles in the management, audit, and regulation of business.

This text also includes two primarily "historical" chapters, 1 and 5. I support exposing our students to relevant historical material. The material presented here is a brief but adequate overview of history that is important for our students to understand as it continues to affect accounting and accountants. Two parts of these chapters are unnecessary. Chapter 1 includes a brief historical review of accounting rule-making and the evolution of the SEC. Most intermediate texts have adequately described the evolution of private-sector accounting rule-making. Chapter 5 includes a description of the basis for auditor liability as a part of a discussion of relatively recent developments in SEC regulation. Auditing texts adequately discuss auditor liability.

I am critical of the book in three areas. Most text and reference books include an index; this text does not. That omission is a significant deficiency. No matter how good the table of contents, and the one here is only adequate, a good index is essential if a reader is to be able to return to a book to review material efficiently. Most texts also include some assignment materials. This book includes a series of discussion and multiple-choice questions. Given the scope and survey nature of this book, the usefulness of multiple-choice questions which must have a narrow focus is questionable. In Chapter 1 some dated material on the structure of the SEC has been used. Changes to bring that material up to date should be incorporated in the next edition, but this does not materially affect the usefulness of the book.

The preface of this paperback indicates that its purpose is to acquaint the reader with SEC regulations on becoming and remaining a public company and that it is intended to be a supplementary text for intermediate, auditing, or accounting theory courses. I believe that this book has achieved its purpose and that it would be a useful supplement to texts for the courses identified.

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JOHN W. PRATT and RICHARD J. ZECKHAUSER, Editors, *Principals and Agents: The Structure of Business* (Boston: Harvard Business School Press, 1985, pp. x, 241, $24.95).

This is a collection of essays for the executive who wishes to understand the implications of principal/agent relationships for the business world. Given the pervasiveness and complexity of these relationships and the technical difficulties of analyzing them, the editors and contributors have done an admirable job.

The introductory essay by Pratt and Zeckhauser uses examples from business to show how organizational structures and incentive arrangements may be more fully understood in the context of a principal/agent relationship. The second chapter, by Kenneth Arrow, reviews the economic foundations of agency, including a comparison of the results of formal agency theory with the observed characteristics of agency relationships in business, and conjectures as to the causes of differences between them.

The following four chapters analyze institutional arrangements that have evolved to manage relationships between principals and agents. The first of these, by Robert Clark, challenges the notions that corporate executives are the agents of shareholders and that the corporation should be viewed as a "nexus of contracts." He proposes a positive theory of the fiduciary relationship between shareholders and corporate managers that could generate testable hypotheses for future research. In the following chapter, Frank Easterbrook reviews insider trading from an agency perspective. He summarizes the arguments (and evidence) for and against allowing managers to trade in the shares of their corporations when they possess information that is not publicly available.

Next is an essay by Mark Wolfson on agency conflicts arising in oil and gas tax shelter programs where a variety of sharing arrangements may exist between the general partner and the limited partners. Wolfson identifies ways in which these conflicts may be mitigated, and conducts empirical tests to determine whether the type of sharing arrangement is associated with differences in the characteristics of drilling programs.

The chapter by Richard Epstein focuses on the implications of agency theory for labor relationships. He argues that "at will" contracting (where either party may terminate the relationship) provides advantages in dealing with the dual problems of agency costs and imperfect information by letting the labor markets achieve characteristics similar to the capital market. Departure from contracting at will, as with unionization, is argued to require complex institutional arrangements with an attendant loss of economic efficiency.

The final two chapters focus on agency relationships within organizations. In evaluating transfer pricing systems in 13 companies, Robert Eccles identifies four agency configurations that describe the delegation of authority and transfer price determination. He describes the effects of the agency configuration on decision making and on perceptions of fairness in the organizations he studied.

The final chapter is a thought-provoking essay by Harrison White on control in agency relationships. White emphasizes the flexibility of agency as its essential strength—placing it between the extremes of formal organization on the one hand and the market on the other. He analyzes the effects of agent specialization on the agency relationship, and states, "The conundrum is that specialization tends to yield reversal of control between principal and agent, a reversal that upsets the root source of agency, the desire of authority to enlarge the reach of its full control" (p. 208).

Does the book succeed in its objective? It covers a very ambitious set of topics, and a thoughtful executive will find a better understanding of economic phenomena which surround us. A number of topics will be a bit abstract for an executive (e.g., whether the firm is best viewed as a "nexus of contracts" or whether an economic system based on contracts at will is superior to one with regulated labor unions). Accountants will find the essays by Wolfson and Eccles of direct interest, but this book has much for an academic accounting audience beyond these chapters. For those not familiar with agency theory, it provides a thorough, yet readily understandable introduction with applications in a wide variety of areas. For those familiar with agency theory, this collection of insightful essays challenges our understanding of its implications and provides questions and issues for future research.

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WILLIAM A. RAABE and JAMES E. PARKER, *Tax Concepts for Decision Making* (St. Paul: West Publishing Co., 1985, pp. xv, 766, $32.95).

This is a comprehensive new text that effectively achieves its stated goal of presenting a basis for developing "both a conceptual foundation and some technical proficiency . . . [in] the prevailing laws of federal taxation" (p. xiii). It is written for graduate students (MBAs particularly) and for non-tax professionals.

The format, as indicated by the title, is geared toward enhancing decision-making skills. Prose discussions of the tax provisions are combined with quantitative examples and problem cases. The authors do an admirable job of introducing the tax laws applicable to individual, corporate, partnership, and fiduciary taxpayers. Even with separate chapters on estate and gift planning, tax shelters, and executive compensation, the entire text can be covered in a semester.

A distinguishing feature of the text is the inclusion of an introduction to the use of microcomputer spreadsheets for tax planning. Thirteen computer case assignments (written for use with VisiCalc, SuperCalc, and Lotus 1-2-3) correspond to examples and problems in the text. These exercises help the reader to learn tax concepts and to appreciate the analytical power available in the popular spreadsheet programs.

The text generally is well written, well structured, and well substantiated. Chapter objectives tell readers what they should expect to learn. A list of key terms at the beginning of each chapter and a glossary at the end of the text enhance the learning process. The "Decision-Making Implications" section concluding each chapter reinforces the strategic planning orientation of the text. Further study of topics of reader interest is facilitated by references to the Internal Revenue Code, Treasury regulations, and court cases. Answers to selected questions and problems in Appendix A give users immediate feedback on mastery of the material.

Overall the text is well-designed and executed, but it has four limitations that potential users may consider relevant. First, several of the computer exercises are merely tests of using the program functions. Although this might provide a sufficient challenge for the computer novice, these assignments are not stimulating for an experienced spreadsheet user. Second, the absence of chapter summaries to help synthesize the material detracts from an otherwise well-designed presentation. Third, present value or future value tables are not provided even though several of the problems and decision cases require this information. Fourth, the only ancillary material available is the solutions manual. Although the questions, problems, and decision cases at the end of each chapter generally are well-developed, a student guide and test material would be useful additions.

In conclusion, the text meets the authors' stated objectives by providing a functional knowledge of the tax law within the context of a broader planning orientation. The scope of the material and the integration of microcomputer exercises make this an especially good primary text for MBAs and other non-tax graduate students.

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HOWARD F. STETTLER and N. ALLEN FORD, Editors, *Auditing Symposium VII: Proceedings of the 1984 Touche Ross/University of Kansas Symposium on Auditing Problems* (Lawrence: School of Business, University of Kansas, 1984, pp. 194, $8.00 paper).

This volume contains eight papers from the seventh biennial auditing symposium held at the University of Kansas. As in prior years, the criterion for selection was that the topic relate to current matters of interest to auditing academicians and practitioners.

In the first paper, David Selley provides an overview of the materiality issue in the U.S. and other countries. Of particular usefulness is his taxonomy of standards, definitions, and status of materiality in various countries. The discussant suggests that additional research directed toward users of financial information is necessary.

Next, Fred Skousen and Steve Albrecht describe the results of a research project conducted to assess auditors' perceptions of changing price disclosures mandated by SFAS 33. They conclude that, while auditors believe that information on changing prices could be audited, it would be of limited usefulness to users. The discussant argues that users' assessments of such disclosures should be the primary concern of standard-setters.

The next two papers discuss the merits of structured and unstructured audit approaches. Jerry Sullivan argues against a highly structured audit methodology, concluding that an approach which incorporates judgment results in more efficient and effective audits. John Mullarkey classifies the Touche Ross audit approach as structured and as falling between two extremes, concluding that a structured approach is best. Both discussants criticize the polar extremes used by the authors as unrealistic and they recommend use of decision aids to enhance auditor judgment. In this reviewer's opinion, the authors are separated more by semantics than by substantive differences.

Donald Leslie analyzes the audit framework, emphasizing inherent risk and the role of statistical sampling in compliance testing. His premise is that the risk models from SAS 39 and SAS 47 may cause erroneous conclusions about final audit risk since they ignore posterior probability. He supports his argument by comparing results from the SAS models and the Canadian model which considers posterior risk explicitly. The discussant argues that the U.S. models are intended to provide guidance and should be supplemented by auditor judgment. He shows that Leslie's model is conservative relative to a model which considers both alpha and beta risk.

David Gwilliam addresses the paucity of auditing research in the U.K. relative to the U.S. He cites limited availability of external funding, little external pressure to conduct auditing research, and the comparative advantage of U.S. academicians as primary reasons. He concludes that U.K. policy makers must translate U.S. auditing research to address U.K. needs, and conduct research for any gaps identified. The discussant offers additional insights and generally is supportive of Gwilliam's views.

Robert Mednick and Alan Winters argue that the ten generally accepted auditing standards no longer are adequate given the range of audit services currently offered. They compare GAAS with proposed attest standards and suggest that the attest standards should either replace GAAS altogether or exist at a higher authoritative level. The discussant argues that the authors do not provide theoretical support for their conclusions.

Finally, Robert Mautz discusses the nature of professional regulation and provides an overview of the AICPA's peer review program. He states that the goal of peer regulation is to supplement rather than to replace public and private regulation.

The proceedings provide a good source of information for readers with an interest in any of the topics. Like the previous six symposia, the editors have managed to assemble a good cross-section of views from both practice and academe.

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PAUL H. WALGENBACH, NORMAN E. DITTRICH, and ERNEST I. HANSON, *Principles of Accounting*, Third Edition (San Diego: Harcourt Brace Jovanovich, Publishers, 1984, pp. xxi, 1065, $27.95).

PAUL H. WALGENBACH, ERNEST I. HANSON, and NORMAN E. DITTRICH, *Financial Accounting: An Introduction*, Fourth Edition (San Diego: Harcourt Brace Jovanovich, Publishers, 1985, pp. xvii, 749, $28.95).

These two textbooks have now appeared in new editions with only a modest revision of their previous formats (reviewed January 1981, pp. 245-246 and January 1984, p. 156). Changes include the expansion of long-term assets to two chapters, the relegation of branching from a chapter to an appendix, three additional demonstration problems, and a reshuffling of organizational trouble spots such as inflation accounting and deferred taxes. The historical and current events vignettes, an excellent feature of the books, are all new, but in several instances former selections were superior. The texts are virtually identical except for the inclusion of seven managerial chapters in *Principles*.

Problem selection contributes substantially to the reputation of these texts. The business decision problems are conceptually an attractive alternative to typical number-crunching exercises, but some should be more analytic and literary. The demonstration problems are helpful and illustrative of difficult points in the chapters, but the text has only 11 of them. The problems available for homework assignment and classroom presentation are virtually error-free, and appropriately rated in terms of difficulty and time.

The authors make difficult material comprehensible to beginning students. Early chapters on the effects of transactions on financial statements and the logic of adjusting and reversing entries make the first trying weeks understandable to the novice. The sections on notes receivable discounting, bonds payable, funds statements, and financial analysis are superior to the coverage in most texts. The authors also include information usually ignored on timely topics such as internal control, electronic data processing, and basic auditing functions.

The books are extremely good on balance, but they could be improved. Hopefully, more extensive revisions will be made for future editions. Some topics could be left to Intermediate texts; these include deferred taxes, earnings per share in complex capital structures, constant dollar and current cost accounting, interest capitalization, construction contract accounting, and changes in accounting principles. The presentation of the latter topic was criticized in an earlier review, but no improvement has been forthcoming. The discussion of these subjects is too superficial to be meaningful.

A number of omissions leave some subject areas incomplete. One is the inadequate and poorly placed discussion of the conceptual framework of accounting. Too little is said about the qualitative characteristics hierarchy of SFAC 2, the users of accounting information, the profession's structure, and the issues of historical costing and full disclosure. The time value of money is discussed without future value tables. No short-term bond investment problems are included. Exchange of similar assets is handled without mention of boot. Contingencies as described in SFAS 5 and "negative goodwill" are not covered.

It might be argued that the Principles book, already at 1,000 pages, should not be expanded. However, considerable space in the financial area could be saved by reducing the coverage given to mechanical functions such as closing entries, posting, and payroll accounting. The elimination of topics better reserved for an intermediate course also would conserve space. Finally, an entire chapter could be dropped by conceding that beginning accounting students derive little appreciation for the issues of consolidations and branch accounting

Space has been conserved in the managerial portion of the Principles text by shortening several mechanical and routine entry illustrations. The periodic treatment of production inventories has been changed from an adjustment to a closing entry approach to be consistent with the changes made in the merchandising inventory chapters.

The traditional job order and process costing chapters also could be improved. Simply charging over (under) applied overhead as an expense of the period probably would be superior to a superficial coverage of the difficult topic of allocation. Also, the FIFO costing method, not predominant in practice, is buried in a footnote without discussion of its rationale.

The text does not present a complete, coherent process costing production report in one illustration in which physical unit flows and associated costs may be traced without reference to other exhibits. It also avoids the issues related to transferred-in costs in beginning inventories by treating them as current period costs. This topic should either be expanded or deferred to a cost text. Some elaboration also would be appropriate about the abstract or artificial nature of calculating "equivalent units of production" to achieve product costing objectives. In an area often poorly handled in basic texts, service department cost distribution is very well done.

The C-V-P chapter provides a good introduction to subsequent chapters which outline special analysis techniques for management. While the focus is on short-run differential analysis via incremental contribution margins, the authors repeatedly caution students to consider the long-run effects on the entity. Qualitative considerations such as impact on employee morale, reliable supply vendors, and opportunity costs complement the applications of differential analysis in decision-making to improve the learning value of this section.

The authors have made two noteworthy changes in the standard costing and capital budgeting chapters. While a much-needed demonstration problem is added to standard costing, an equally useful and pragmatic illustration of differential investment analysis has been deleted from capital budgeting. The improper use of non-ACRS depreciation methods as a tax shield in capital budgeting and the greater emphasis placed upon standard costing rather than budgeting as a control device has somewhat weakened these chapters.

Income tax coverage has been updated, although ACRS is only briefly mentioned in the plant asset section. A note about partnership taxation has been added and the worksheet to calculate an individual's tax liability has been streamlined. The supplementary materials (which include study guides, solution manuals, transparencies, and five student practice sets) generally are adequate and competitive with most of the support packages of other texts. However, certain key text illustrations and demonstration problems are not included in the transparency package.

In summary, the Principles and Financial texts continue to be leading contenders among introductory textbooks. On balance, they lean slightly toward the conceptual approach in basic accounting. They warrant serious consideration for adoption in the introductory courses at the undergraduate level and for the first accounting course in an MBA program.

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WANDA A. WALLACE, *A Time Series Analysis of the Effect of Internal Audit Activities on External Audit Fees* (Altamonte Springs: The Institute of Internal Auditors Research Foundation, 1984, pp. xv, 295, $33.00 paper).

This research monograph examines the effect of internal audit assistance on external audit fees and profiles the changes in internal audit activities, from 1975 to 1981. The topic is of relevance to corporations and auditors due to their desire to strengthen internal controls and reduce audit fees by relying on internal auditors.

The study used a questionnaire to collect data over the seven-year period on internal audit activities (actual and budgeted), external audit fees, and specific risk assessments. Many interesting findings were noted. First, in 1975, only 57 percent of the firms responding coordinated their internal audit activities with their external auditors, while 81 percent of these same firms were doing so in 1981 (p. 53). Second, when coordinated activities between the external and internal auditors did occur, the "savings" were that the external audit fee either remained at a constant level, despite increasing billing rates, or decreased by ten percent or less. Third, the quality of internal audit practices has improved over time and concurrently, the external auditor has placed increased reliance on the internal audit department. Finally, an audit fee regression model was presented to provide a benchmark for evaluating an entity's current audit fee.

The research method used was able to control for several confounding events that plagued prior research studies on external and internal audit fees. In particular, it allowed comparisons across companies, industries, samples, audit firms, and time which have been ignored in prior single-period audit fee studies. The study was well designed, very thorough, and written to be understood by both academics and practitioners. The major limitations are inherent in any research dealing with questionnaires and relate to the sample size (response rate =3.55 percent; n=117) and any potential bias by the respondent in completing the questionnaire.

In conclusion, the study is recommended for the internal audit departments of corporations to provide some insights into the relationship between internal and external auditors. The study not only deals with the relationship of audit fees, but also provides a detailed description of demographic statistics, budgets, reports, responsibilities, and activities concerning internal audit departments. External auditors would find the study of interest and useful in determining the pricing of audit services, the degree of reliance to place on internal auditors, and the benefits of coordinating activities with internal auditors. The monograph also would be useful as a supplement or reference in internal auditing and graduate accounting courses.

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V. K. Zimmerman, Editor, *The Recent Accounting and Economic Developments in the Middle East* (Urbana-Champaign: Center for International Education and Research in Accounting, Department of Accountancy, University of Illinois, 1985, pp. v, 242, $10.00 paper).

This book has 15 selected articles that deal with accounting and financial reporting developments in the Arab Middle East. Nine of these are devoted to Saudi Arabia and its neighbors, the Arab Gulf states. Islamic banking without interest and accounting information systems for such banks is the subject of two articles. The remaining four articles deal with the practice of public accounting in the Middle East and the role of international accounting firms in selected Middle Eastern and African countries.

Most of the material was presented in seminars held at various times in the United States and other countries over the last few years. Thus, some information items and statistical citations are either out-of-date or incomplete. For example, the statement is made that "no attempt has thus far been made to develop any type of accounting or auditing standards . . . in the [Arab Gulf] region" (p. 74). The longest of the 15 articles, however, is devoted to the "Design and Application of Professional Standards in a Developing Country: The Case in Saudi Arabia" (pp. 43-64).

Research conclusions dealing with generally accepted accounting principles have been construed to apply to other countries in the region, but the research was based on the economic and regulatory environments of only one country: Saudi Arabia. While other countries in the region, that are members of the Gulf Cooperation Council (GCC) (Kuwait, Oman, Bahrain, Qatar and United Arab Emirates) may be similar to Saudi Arabia in that their economies are based on oil, one can hardly assume that results of a research project can be applied to these countries when they were not included in the research.

Despite some shortcomings, the book provides a sound basis for getting an understanding not only of the accounting developments in the Arab Middle East but also of certain economic, social, and business education aspects in these countries. It should prove invaluable as a reference for researchers interested in the practice of public accounting in a region that has more than 70 percent of the proven world oil reserves. To the knowledge of the reviewer, no other book contains as many articles and as much insight on accounting developments in the Arab Middle East. John Zick's article on "International Trade: Opportunities in the Arabian Gulf" relates interesting experiences of one of the "Big Eight" accounting firms in a developing country such as Saudi Arabia. Also, Vinod Bavishi's research on the operations of international accounting firms in Africa and the Middle East is particularly interesting considering the dearth of published material on the operations of these firms in developing countries. Accounting professionals and educators interested in the region should find these two articles especially useful and informative.

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CAPSULE COMMENTARIES

Harvey S. Hendrickson, Editor

LAWRENCE D. BROWN and MIKLOS A. VASARHELYI, *Accounting Research Directory: The Database of Accounting Literature* (New York: Markus Wiener Publishing, Inc., 1985, pp. iv, 423, $39.00 cloth, $29.00 paper).

This is a directory or index of all major articles published in six journals (*The Accounting Review* (*AR*); *Accounting, Organizations and Society* (*AOS*); *Auditing: A Journal of Practice & Theory*; *Journal of Accounting and Economics* (*JAE*); *Journal of Accounting Research* (*JAR*); and *Journal of Accounting, Auditing and Finance*) during the 22 years, 1963 to 1984.

In Part I, the articles with titles and other bibliographic data are listed alphabetically by author; then in Part II, those articles that have been cited at least once in four of the journals (*AR, AOS, JAE*, and *JAR*) during the nine years from 1976 to 1984 are listed (*sans* their titles) under four taxonomies: mode of reasoning or analysis, research method, school of thought, and subject area. In Part II, the articles under each taxonomy are listed by citation index number (the annual average of the number of times the article was cited during the 1976–1984 period). Part II represents a substantial effort and is the result of merging two data bases (L. D. Brown and J. C. Gardner, "Applying Citation Analysis to Evaluate the Research Contributions of Accounting Faculty and Doctoral Programs," *The Accounting Review*, April 1985, pp. 262–277 and M. A. Vasarhelyi and J. Berk, "The Multiple Taxonomies of Accounting Research," Unpublished Manuscript, Columbia University, 1984). Although this reviewer did not attempt to evaluate the accuracy of the classifications of specific articles, the volume might be made more useful (1) if the taxonomies of the articles given in Part II were included in Part I with the respective article's bibliographic information; (2) if the articles under each classification in Part II were listed alphabetically by author rather than by citation index number; and (3) if all the articles in Part I had been classified and included in Part II.

This pioneering effort would be useful primarily to accounting researchers and teachers in the selection of articles for reading lists and/or bibliographies.

H.S.H.

BRYAN CARSBERG and TONY HOPE, Editors, *Current Issues in Accounting*, Second Edition (Oxford and Atlantic Highlands, NJ: Philip Allan and Humanities Press, 1984, pp. xi, 317, $37.75).

This book of readings was designed as a supplement for an introductory accounting course, but its contents could be useful in many other courses and at other levels. It consists of 18 essays, 17 of which were written for the first edition and all but one of these has been revised for the second. The authors include one accounting practitioner, the editors, and 17 other faculty members from 14 universities (13 in the U.K. and one in the U.S.). All but one of the faculty members are in accounting or accounting and finance departments and five are still at the University of Manchester where the first edition (not reviewed) was developed. Most of the academic authors would appear in an international Who's Who of U.K. accounting educators and authors.

A more appropriate, but laborious, title for this readable and stimulating collection might be "Essays on the History, Standards, Uses, Interfaces, and Future of Accounting and Auditing."

Although all of the articles contain much material that is not unique to a single country or region, the primary focus is on the U.K. and Europe. Thus, this volume would be most useful as a supplement in an international accounting course.

H.S.H.

GENE W. DALTON and PAUL H. THOMPSON, *Novations: Strategies for Career Management* (Glenview, IL: Scott, Foresman and Co., 1986, pp. xii, 280, $18.95).

This is a useful pioneering effort on careers that are described in terms of stages and novations. Four major stages are identified and discussed; these are apprentice, colleague, mentor, and director. Novation is described as successful movement from one stage to another. Applied to colleges and universities, the three professorial ranks would correspond approximately to apprentice, colleague, and mentor stages, while deans and higher-level administrators would be at stage IV, the director stage. In public accounting, the managing partner or partners-in-charge of offices, divisional and national managers, and partners who manage a specialization would be considered to be at stage IV (p. 128).

Much emphasis and space is given to the importance of mentoring, which is a one-on-one-teaching process, and sponsoring, which is the providing of opportunities and experiences of greater responsibility for persons who have proven themselves in the basics and are considered to have the capacity to make significant current and future contributions (p. 123). Both mentoring and sponsoring are important not only to the persons directly involved, but also to the development, stability, and continuity of their professions and organizations.

The authors hold doctorates from and were professors at the Harvard Business School, where they began their study of careers some 15 years ago.

The material presented is stimulating, interesting, and reinforcing, since many of the points are similar to those that this reviewer has witnessed. It indicates a background of substantial longitudinal, case, and other research. Since most of it is anecdotal, it is more a trade or reference book than a text.

It would be useful reading to anyone beginning a professional career, as well as later when career crises and changes appear on the horizon. It also would be useful reading and a valuable library addition for college professors, counselors, placement directors, and other administrators involved in advising and/or directing professionals at any stage of their careers. They might recommend the book to their students, clients, colleagues, and constituents. It also might be used as a supplement in credit or continuing professional education courses that consider professional practice and/or careers.

H.S.H.

HARVEY T. DEINZER, *Development of Accounting Thought* (New York and London: Garland Publishing, Inc., 1984, pp. xiv, 184, $25.00).

This reprint included in the 1984 Garland collection was published in 1965 and is combined here with its review by Carl Thomas Devine that appeared in THE ACCOUNTING REVIEW (January 1966, pp. 189–192). The book is presented as a syllabus for a graduate course in financial accounting theory. The many questions add substantial depth and breadth to the text, most of which is a critique or polemic on the attempts to establish accounting principles primarily from the 1936 American Accounting Association Executive Committee report, "A Tentative Statement of Accounting Principles . . . ," to the 1962 monograph, Accounting Research Study No. 3, written by R. Sprouse and M. Moonitz (the latter, then Director of Research at the AICPA). The text is put into perspective by the Devine review. This would be a useful supplement in graduate accounting theory courses.

H.S.H.

F. R. M. DE PAULA, *The Principles of Auditing* (New York and London: Garland Publishing, Inc., 1984, pp. xvi, 207, $30.00).

This is a reprint in the 1984 Garland collection that was a tenth edition textbook when published in London in 1939 (reviewed March 1940, p. 135). It would be useful as an addition to accounting libraries and to students of accounting and accounting history.

H.S.H.

DAN M. GUY, JOHN R. CLAY, and DENNIS R. MEALS, *Guide to Compilation and Review Engagements,* Sixth Edition, Three Volumes (Forth Worth: Practitioners Publishing Co., 1984, Vol. I: pp. xiii, 323; Vol. II: pp. iii, 338; Vol. III: pp. iii, 171; Three-Volume Set, $105.00 looseleaf).

What should a CPA do when the client needs a report from the CPA but does not want a complete audit? Prior to 1979, the CPA had no professional guidance as to what procedures to perform in a nonaudit engagement or how to report the results. Consequently, a nonaudit engagement resulted in the issuance of a disclaimer of opinion both when limited analytical procedures were performed and when no procedures were performed. Thus, when reading such a disclaimer of opinion, both financial statement users and the CPAs' clients were uncertain as to what was actually done. Unfortunately, many CPAs naively assumed that no legal liability could result from an engagement in which a disclaimer of opinion was issued. A few notorious court cases involving nonaudit engagements clearly indicated to accountants that more guidance was needed on nonaudit work.

In 1979 the AICPA Accounting and Review Services Committee issued the first Statement on Standards for Accounting and Review Services (SSARS). It introduced two well-defined levels of non-audit services: the compilation and the review. This three-volume set is a comprehensive and extensively illustrated reference for today's practitioners on compilations and reviews. It is an easy-to-use, practical guide covering nearly every conceivable situation that could arise in the performance of either a compilation or a review.

The three volumes quote liberally from the SSARS and other authoritative guidelines. The first volume contains background on development of the concepts of compilation and review and various checklists to use in the conduct and performance of one of these nonaudit engagements for financial statements prepared in accordance with GAAP. The second volume gives guidance in situations other than a basic GAAP engagement: interim statements, statements presented on another comprehensive basis of accounting, personal financial statements, proprietorships, partnerships, and S corporations. The final volume presents guidelines for engagements with statements on prescribed forms and prospective statements.

The text would be a welcome addition to the reference library of any practitioner or consultant who prepares or uses compilations or reviews.

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Leon E. Hay, *Accounting for Governmental and Nonprofit Entities,* Seventh Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xvii, 807, $38.95).

Although Dr. Hay has made several major changes for the seventh edition, the text continues to be a traditional governmental accounting text (the sixth edition was reviewed April 1981, pp. 422–423). Many of the chapters have been changed only as updating has been necessary to present material in compliance with official releases of standard-setting bodies. Although many of the changes are rearrangements of the subject matter, significant new subject matter has been added in several areas. The rearrangements of subject matter improve the flow of information to make it easier to follow and to facilitate learning. The target market of the text continues to be a full three-semester-hour course; but unless students have had some prior exposure, covering the entire text in one semester is almost impossible.

As with earlier editions, the first two-thirds (14 of 22 chapters) is devoted to a discussion of fund accounting for governments. The last third (chapters 15 through 22) deals with cash planning and budgeting, cost determination, local and state school accounting, college and university accounting, hospital accounting, voluntary health and welfare organization accounting, federal government accounting, and auditing in the public sector. Normally the instructor will select the first 14 chapters and about one-half of the last eight.

Four major changes have been made in the subject matter. First, the General Fund and Special Revenue funds in the basic governmental accounting presentation are covered in two chapters where three were used in an earlier edition. This has been done by combining the discussion of revenue and expenditures in one chapter. In making this change, some material has been eliminated. But the text is improved because the material is easier to cover and the instructor is given flexibility to insert material that he/she considers important.

A second major change is that in earlier editions the material on budgets was included in the discussion of basic governmental accounting while in this edition, most of the budget material is presented in Chapter 15 with the discussion of cash. This change has made room in the basic governmental accounting presentation to introduce a more extensive discussion of the structure of fund accounting. The material added follows quite closely the content of NCGA Statement 1. This change significantly improves the text. The material added is very important, and the extensive budgetary discussion is best treated as one of the optional subjects covered in the last eight chapters.

The third change was to combine the discussion of the Agency Fund with coverage of investment pooling. The Agency Fund seemed to be excess baggage when combined with trust and retirement fund accounting. But since agency fund accounting does not have sufficient subject matter to justify a complete chapter, combining it with investment pooling, which also requires relatively little space, makes a good chapter and also allows investment pooling to be dealt with in the basic fund-accounting presentation.

The fourth change is the addition of a chapter on cost determination. The emphasis presently being placed on financial disclosure and fixed asset accounting by the Governmental Accounting Standards Board (GASB) evidences the author's foresight and improves the text.

The text has been carefully updated to include coverage of NCGA, FASB, and AICPA official releases. However, the timing of the edition was unfortunate because the GASB was being established as the text went to press. Dr. Hay describes in the preface the agreement reached by the FAF, the FASB, and the Public Interest Groups, but the increase in standard setting activities as a result of GASB will likely necessitate an earlier revision of the text than otherwise would have been necessary. The text continues Dr. Hay's excellent work in the area of governmental and not-for-profit accounting.

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EMERSON O. HENKE, *Introduction to Nonprofit Organization Accounting*, Second Edition (Boston: Kent Publishing Co., 1985, pp. xvii, 571, $36.00).

Writing and selecting a nonprofit accounting text is no small task for several reasons. First, the course is likely to be taken primarily by seniors anxiously awaiting graduation and preoccupied with many other activities, such as preparing for the CPA exam and searching for their first professional position. Second, the students usually begin the course with little or no background in the nonprofit sector and some even have a bias against it. Third, a great deal of unfamiliar and somewhat abstract material must be included in this basic course: the environment, underlying concepts and principles of accounting, and increasingly, auditing in a variety of governmental, academic, hospital, welfare, health, religious, charitable, and other nonprofit organizations. Moreover, a significant number of fundamental changes are occurring in the nonprofit area—for example, the working agenda of the newly created Governmental Accounting Standards Board.

Given all this, the preparation and choice of a text takes on added significance and complexity. Some potential authors and publishers recognize this and are taking a wait-and-see posture.

Henke's approach is a significant departure from other texts, and in many ways attempts to deal with the demands placed upon a nonprofit text. This edition continues in the tradition of its predecessor (reviewed October 1980, pp. 698–699). It is designed for a quarter or semester course for students who have completed at least one introductory accounting course. The first of the four parts focuses on distinguishing the nonprofit and private sectors and on introducing some of the underlying accounting principles and concepts that apply to most nonprofit organizations. For example, it includes discussions of "pure profit enterprises," "quasi-profit organizations," "quasi-nonprofit entities," and "pure nonprofit entities." Henke also reviews his categorization of "source and disposition" and "self-sustaining" funds. An effort then is made to discuss some of the fundamentals of the various funds and account groups within this generalized context without immediately getting the student immersed in the details of the accounting procedures and practices for the several kinds of nonprofit entities.

In the second part, several chapters are presented on the more detailed accounting practices and procedures for governmental entities. But unlike others, this text tries to deal with the different funds and account groups in a more conceptual and less detailed way; for example, the treatment of capital projects, debt service, and special assessment funds is combined into a single chapter.

The third part, "Accounting For Other Nonprofit Organizations," covers (1) colleges and universities, (2) hospitals, and (3) health and welfare agencies, churches, and other organizations.

Part four offers an interesting and imaginative treatment of both the internal and external uses of accounting data. The final chapter raises the issue of "operational-accountability" reporting (*vis-a-vis* "dollar-accountability" reporting) which includes full accrual accounting and depreciation recognition. This chapter, along with some discussion in Part I, briefly raises some interesting questions on efficiency and effectiveness, the use of community resources, and community services provided—suggestive of the service level accomplishments and financial reporting dilemma currently under discussion. Unfortunately, little in-depth, direct discussion is given to this larger and important issue.

A solutions manual and a manual for suggested examinations (instructor's manual) are available.

If the freshness of the approach and the emphasis on concept, as opposed to detail, are strengths of the text, they also lead to a few deficiencies. While the attempt to introduce and generalize in Part I is commendable, it also leads to redundancy. One seems to go over the same material several times. Part I, currently consisting of three chapters, probably could be shortened substantially. The text uses a number of hypothetical or model financial statements to avoid getting lost in detail. But this deprives the student of the fun and sense of reality that accompanies analyzing the actual statements of a real organization. Similarly, students complain that some exercises and problems are not covered adequately in the text. Also, while many of the exercises and problems are adapted from CPA exams, some seem to be so conceptual as to lose meaning or identity. Finally, despite the groundbreaking nature of the text, there is inadequate coverage of expanded-scope auditing and the implications of service level accomplishments in the nonprofit sector—even accrual-based financial statements say little about the performance of a nonprofit entity.

In conclusion, this edition continues in the innovative and commendable tradition of its predecessor. Some improvements have been made —a useful glossary is now included. Its conceptual approach recognizes the breadth and evolutionary nature of the field. Those more comfortable with a chapter by chapter treatment of "fund accounting" may prefer another text. Those who want to both convey conceptual information on nonprofit accounting practices and devote classroom time to the shortcomings of nonprofit accounting or to other specialized areas (i.e., nonprofit auditing) will enjoy the Henke book. Regardless of the professor's selection, the availability of an alternative choice is a welcome addition to the field.

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G. H. HOFSTEDE, *The Game of Budget Control* (New York and London: Garland Publishing, Inc., 1984, pp. xiv, 363, $45.00).

This reprint in the 1984 Garland collection was published in the Netherlands as a paperback in 1968 (reviewed April 1969, pp. 428–429). The title is misleading since "game" is used in a very specialized way to mean "organized play according to definite rules . . . [and] objectives, and usually competitive" (p. 77). It appears to be based (as indicated by the 1969 reviewer, D. Green, Jr.) on the author's doctoral dissertation. The research consists largely of in-depth interviews on a very small sample of only six plants in five companies. This book would be useful as an addition to accounting libraries and as a supplement in graduate-level seminars in cost, managerial, and/or behavioral accounting.

H.S.H.

LYMAN A. KEITH and RICHARD L. KEITH, *Accounting: A Management Perspective*, Second Edition (Englewood Cliffs: Prentice-Hall, Inc., 1985, pp. xiii, 448, $29.95).

Those looking for an introductory managerial accounting textbook that can be used to educate non-accounting students should consider adopting this one. It has been revised in content and by the addition of a second author, R. L. Keith. This edition, like the first (reviewed October 1980, pp. 700–701), emphasizes decision-making aspects of managerial accounting rather than extensive in-depth "number crunching," which often is stressed in the more traditional managerial/cost principles accounting textbooks.

The book is written in a narrative style that facilitates student understanding about decision-making. Whereas theoretical concepts are interwoven throughout each chapter to provide necessary conceptual frameworks, the main emphasis of all chapters is on pragmatic decision-making applications. Numerous real-life examples are narratively described and appropriately supported with well-designed managerial accounting quantitative analyses.

In five parts and 16 chapters, the topics covered include an overview of accounting, costs and their behavior, budgeting, product costing, and additional decision-making considerations. Each chapter begins with an overview and important questions for students to consider and ends with suggested summary answers to those questions and a listing of key terms or concepts which students should review and master.

A wide selection of questions and problems has been provided at the end of each chapter. Problems range in complexity from lower to higher levels of difficulty to give instructors considerable latitude to choose the variety that suits their preferences.

Differences between the first and second editions include extensive changes in end-of-chapter problems and only minimal alterations in textual content.

Constructive criticisms center around two main concerns. First, the textbook occasionally presents an overly complex and yet incomplete coverage of some topic areas. For example, in Chapter 12, "Control Through Standards and Standard Costs," the authors include too much in-depth discussion of direct material, direct labor, and variable overhead variance analyses, but do not mention *fixed* overhead variance analysis. Second, the *Instructor's Solution Manual* contains a number of weaknesses. Too often it provides solutions in narrative form when tabular data formats would be more desirable for instructional purposes. Of equal concern, the quantitative solutions often are so summarized that they omit essential detailed computations. Finally, the *Manual's* ultra-small print size requires that instructors must first make photo-enlargements so that suitable visual aids can be produced for classroom use.

In summary, this book offers a somewhat different and yet appropriate approach to managerial accounting that is combined with a strong emphasis on accounting applications. The text has pedagogical merit when used either for undergraduate nonaccounting students or for MBA students who need a managerial accounting foundation prior to pursuing graduate-level studies.

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J. KITCHEN and R. H. PARKER, *Accounting Thought and Education: Six English Pioneers* (New York and London: Garland Publishing, Inc., 1984, pp. xv, 120, $20.00).

This is a reprint in the 1984 Garland collection of a book that was published in 1980 (reviewed April 1981, pp. 430–431). It recaps the careers and writings of six English pioneers in accounting who lived during the period 1841 to 1958: E. Guthrie (principles), F. W. Pixley (auditing), J. M. Fells (cost accounting), L. R. Dicksee (auditing), Sir A. E. Cutforth (consolidations), and F. R. M. de Paula (accounting education, taxation, and auditing). This book would be useful as a reference for accounting libraries and as a supplement for accounting history courses.

H.S.H.

PAUL B. W. MILLER, D. GERALD SEARFOSS, and KENNETH A. SMITH, *Intermediate Accounting*, Second Edition (Homewood: Richard D. Irwin, Inc., 1985, pp. xxiv, 1336, $38.95).

Textbooks serve primarily as information sources. Accounting texts, like those of many other technical areas, are particularly critical in fulfilling this function, given the myriad topics generally included. At the intermediate or more advanced levels, appropriate topical matters must be included, and the presentation must facilitate the learning of the material. The text also must give the student a flavor of the professional literature, and instill a sense of professionalism in those aspiring to enter the profession.

In fulfilling the information source role, most accounting texts can be placed along a continuum going from a largely theoretical approach (at one extreme), to GAAP as promulgated (an intermediate point), and ending with practical implementation of GAAP (at the other extreme). While all of these areas are related, the degree to which an author chooses to stress an area, or some combination, will affect the material included in the text.

Miller, Searfoss, and Smith adopt a practical implementation approach, similar to the approach adopted in the first edition of the text. The reviewer of that edition noted that each chapter was structured in terms of (1) nature of the topic, (2) accounting objectives, and (3) accounting practice (THE ACCOUNTING REVIEW, January 1983, pp. 202–203). This approach, while laudable in that it may help the student when confronted by contexts similar to those shown in the text, has certain limitations. For example, one must show many contexts to ensure that the material covered is sufficiently broad to expose the student to relatively complete coverage of a given topic. This likely increase in contexts presented means that other areas must be given less emphasis—GAAP as promulgated or the underlying theoretical arguments (other points of the continuum). This choice of emphasis is evident, for example, in Chapters 7 (present value techniques), 13 (liabilities), and 14 (owner's equity). They include very little theoretical discussion (for example, the liability chapter has no discussion of the fundamental characteristics of a liability mentioned in Concepts Statements 3 and 6), but fairly complete coverage of contexts. Discussion in the chapters tends to be explanations of how or why extant practice developed.

In many areas, the adoption of an implementation (generally inductive) approach is congruent with the nature of the topical matter. For example, topics such as inventory or depreciation accounting offer less opportunity for innovation or discussion of underlying concepts. The authors' coverage in many of these chapters is thorough and informative. Nonetheless, in many other chapters the lack of theoretical discussion is likely to be perceived as a deficiency by many readers and potential users.

This implementation orientation also is apparent in the problem sets. While the chapters contain a wide range of problem types, they tend to be restricted to the contexts covered in the chapters. This tends to limit consideration and discussion of some of the broad concepts underlying specific topic areas. As the text currently is structured, it is difficult to draw together some of the broad themes underlying much of financial accounting (e.g., the nature of a liability is difficult to address given the structure of the liability chapter).

The text generally is well-written. Topical coverage is similar to that found in most competing texts. The layout is clear and generally easy to follow. All of the typical accessory materials —student study guides, workpapers, outlines, solution manuals—are available.

However, given the implementation orientation of the book, too little space is given to introducing the student to the professional and other literature. It seems reasonable to expect that texts provide relatively complete coverage of at least two of the main reference points of the continuum mentioned earlier. Generally this is typical of most texts written for the intermediate market. This text often discusses only one aspect of the continuum. Supplementation is probably necessary in most teaching contexts.

In conclusion, this is a readable, well-written text. However, given the orientation of the subject matter, most users are likely to require GAAP guides or other supplements.

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Janet Pryce-Jones and R. H. Parker, *Accounting in Scotland: A Historical Bibliography* (New York and London: Garland Publishing, Inc., 1984, pp. xviii, 107, $20.00).

This is a reprint in the 1984 Garland collection of a second edition that was published in Scotland in 1976 (the first edition, 1974, was reviewed October 1975, pp. 938–939). Since the changes for this edition were primarily updating with the addition of a few new items, this appears to be more like a second printing. The major section (Part I of the book) lists books on accounting and related subjects published in Scotland between 1683 and 1920. Part II lists books and articles that transcribe and discuss Scottish accounts dating from 1264 to 1975. Part III lists books and articles on Scottish accounting history. The book has two indexes: one by author and one by title. This book would be most useful as a reference for accounting libraries and research by accounting historians.

H.S.H.

Robert Ronstadt, *The Art of Case Analysis: A Guide to the Diagnosis of Business Situations,* Second Edition (Dover, MA: Lord Publishing, 1980, pp. viii, 189, $9.95 paper).

Much has been written about the case method of instruction from the viewpoint of the teacher or discussion leader. This useful little book is distinctive because it is directed toward the student. It presents advice and suggestions about "developing a personal system for case preparation and discussion" (p. 1). It contains chapters on reading a case efficiently, analyzing and preparing a case for discussion, discussing a case in class, developing strong study groups, and writing good case reports. Most students, particularly undergraduates, who encounter the case method for the first time experience difficulty in developing these skills. The book contains a wealth of practical advice to students. In addition, it contains chapters on analytic tools for case analysis, a sample case analysis, and a brief compendium of economic and financial statistics useful in case analysis. The reviewer uses this book as a required supplementary reading in an undergraduate honors class and finds that it significantly improves the quality of in-class discussion and case reports.

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SOFTWARE SUMMARIES

Harvey S. Hendrickson, Editor

SHELDON P. NEEDLE, *A Guide to Accounting Software for Microcomputers*, 1985 Edition (Rockville, MD: Computer Training Services, Inc., 1985, pp. xviii, 194, $280.00 looseleaf including 3 disks, updates available semiannually at additional cost).

A Guide to Accounting Software for Microcomputers, enclosed in an impressive cloth binder, provides documentation for "The Requirements Analyst," a three-diskette software set of Lotus worksheets. But it does not include the Lotus 1-2-3 software, which must be acquired separately. The worksheets are accessed by menus so that the user need not be acquainted with Lotus commands. A better name for the worksheets might be "programs," since Lotus macros are used to move from one worksheet to another. "The Requirements Analyst" is a "tool to assist computer professionals in the evaluation and selection of microcomputer accounting software for businesses." The targeted users are consultants, computer dealers, and CPAs, but it also would be a useful addition to college computer libraries and to the libraries of computer and systems laboratories.

The diskettes are the standard 5¼″, double-sided, double-density format for microcomputers that run on PC DOS 2.x and higher versions, with either a floppy or hard disk drive. The Lotus program is required to access the diskettes that can be copied for backup. No problems were encountered in loading the diskettes onto a hard disk and using them with Lotus Rel. 1.

The program has four parts. The first is a database of the features and elements of each of the modules contained in the chosen accounting software packages (brands). The second is a set of help screens that explain the operation of the program and the features and elements. The third is worksheets and macros that permit identification and calculation of suitability measures of the brands. The last part is the Lotus program itself, which may remain hidden behind the menus and help messages or may be accessed directly to customize the evaluations and reports and to perform "what if" analysis.

At the outset, a main menu automatically appears on the screen; this allows the selection of five options and an exit. One option is an onscreen help routine that explains the program. A second reset option allows the user to start a new process of selection and evaluation of software, unless it is desired that data from previous evaluations be kept and included in the analysis. A third option selects specific brands of software to be evaluated (20 can be selected, but only 12 of the "high-end" microcomputer software packages are included—they were chosen on the basis of their "popularity and versatility"; two more are promised later and the user can add others). Options four and five lead to feature and element analysis (a feature is a broad characteristic, such as a reorder quantity for inventory; an element is a more detailed capability, such as multiple prices for inventory items).

A pass through a program might be made as follows: First, a reset is performed to start. Then the brands (e.g., "ABS," "TCS," and "BPI") are selected by placing a "+" by their names on a list. In feature analysis, a selection is made of the module(s) to be considered (e.g., inventory control), again by typing a "+" next to its name in a list (eight modules are presented, from General Ledger to Security and Auditing). A list of features is presented and a "+" can be placed next to each to indicate that it is absolutely needed, or a number from one to ten can be used to indicate how important a particular feature is. When the page full of features has been marked, on command the program will compute the percentage of the requirements provided by each brand in descending order. If another module (e.g., Accounts Receivable) is selected, another list of features is marked. When two or more modules have been completed, combined percentages across all modules can be obtained for each brand. An identical procedure is followed in the element analysis, except the list of elements to be marked is considerably longer. The analyses also can be printed on paper.

The accompanying written documentation is lean, but relevant. About five pages of narrative are included on the good and bad attributes of each brand. Other chapters include a general discussion of the advantages and disadvantages of multi-user and networked accounting systems, instructions on installation and operation of the software, charts of requirements, specifications, strengths and weaknesses of the brands, and glossary and updates.

On the whole, this software has a good selection of packages, but it also has some (e.g., BPI, which is cumbersome and inflexible, and Business Library, which has not been debugged and is tricky to install) that are inferior to such packages as Excalibur, Attache, and Accounting Plus.

This software is a good tool for screening the many alternative microcomputer accounting packages that are available to determine those that are more appropriate for a given set of circumstances. It works well and the documentation is direct and matches the needs of the user. However, the presentation should have had greater depth; for example, if it had included samples of the report formats, file layouts, types of menus, and entry screens, the user could get a better feel for the way the accounting software might work and how the output should look. The selection of an accounting package for a business must consider these less tangible factors as well as the more measurable features and elements.

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NUTSHELL Information Filer (Needham Heights, MA: Leading Edge Software Products, Inc., 1985, pp. xii, 347, $150.00 paper user's manual and 2 disks).

NUTSHELL is a menu-driven file management system that runs on IBM PCs and compatibles. It is very easy to learn to use and can be self-taught. It has a tutorial that shows step-by-step how to create files and print reports. The on-line help messages are quite detailed and conclude with a reference to the pages in the manual that deal with that topic. The manual itself is easy to read. The menu screens are clear and easy to follow; experienced users, moreover, can by-pass the menus.

NUTSHELL provides great flexibility for both data presentation and file modification. Multiple report formats can be created by rearranging and masking various fields. (Fields that are masked are not physically lost, just hidden from view in a particular layout.) It also is possible to add new fields to existing records at any time, without affecting the data previously entered. Fields can be declared to be text, date, numeric, calculation, or summary type. Calculation fields are defined to be the result of applying formulas to other fields; summary fields can be used to represent either totals, averages, or counts of other fields.

NUTSHELL does have several limitations. Although it is not hard to create ASCII files for use in other programs (e.g., word processing), it is more difficult to import ASCII files created by other programs for use in NUTSHELL. Another problem is the lack of a query language. Finally, because NUTSHELL is a file manager rather than a database system, only one file can be opened and accessed at any one time.

NUTSHELL is useful for introducing students to the concepts of file management and file processing. Students can use it to create, update, and sort files containing both numeric and nonnumeric data. It can be learned very quickly, and with a minimal amount of instructor assistance, thus making it very attractive for use in an introductory computer lab designed to expose students to a variety of software packages.

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BOB WALLACE, *PC-Write Version 2.6* (Seattle: Quicksoft, 1986, pp. 16, $10.00 tutorial and disk).

PC-Write is a powerful word processor that satisfies the writing requirements of most students and many professors. Because the program is distributed as "Shareware," it can be given to other users as long as the shareware agreement is satisfied. Quicksoft's floppy disk contains the latest program version, a "Quick Guide," and a tutorial. A printed copy of the tutorial and a cue card for commands also are provided.

A separate 336-page manual is available for a nominal amount, but is not needed for effective use of the program. By registering with Quicksoft and paying a $75.00 fee, users receive a copy of the manual and the program's source code (in PASCAL).

Educational institutions that register can distribute PC-Write to students and faculty without additional fees. Quicksoft also provides the tutorial in a printed form ready for duplication to registered educational users.

PC-Write operates on most IBM-compatible personal computers, and supports over 200 printers including the Hewlett-Packard LaserJet.

This is a sophisticated word processor that compares favorably with packages costing four to five times as much. It has an excellent help menu system accessible from inside of the program. Word processing features such as word wrapping, block moves, search and replace, margin control, windows, and multiple headers and footers are supported. Footnotes, table of contents, and indexes can be generated when a document is printed. Multiple fonts are allowed in printed documents. The program generates ASCII files, which means that moving information from PC-Write to other programs is not a problem. For advanced users, the program has an internal keyboard macro option. The program has a host of other features too numerous to list here.

Commands are entered using function keys and special key combinations, and most WordStar commands also are supported by the program. PC-Write uses separate programs for editing and printing documents.

Because of the improved help menus and tutorial in Version 2.6, novice users can master the basics of the program in a short period of time. Using the program's advanced features will require some learning effort, but this is required by most software packages. The maximum file size allowed by the program is 60K, which is about 30 double-spaced pages, but large documents can be accommodated by breaking the text into smaller units.

In summary, this is an excellent word processing program that is especially attractive to educational users because of the liberal distribution policies.

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OCTOBER 1986 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The REVIEW *is published on the first day of January, April, July, and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 33583. All replies to box numbers should be on separate sheets to facilitate forwarding. There is no charge for this service to AAA members and associate members seeking employment. Others will be charged a fee of $100 per insertion. Ads should not exceed 100 words.*

#401 POSITION WANTED. Ph.D. (1980), CPA. Numerous publications in refereed and other journals and paper presentations at national and regional meetings. Desires faculty position at AACSB school or at school with firm commitment to achieving accreditation. Currently a tenured associate professor. Available fall 1987. Primary area auditing; also cost/managerial and financial.

#402 UNIVERSITY OF SOUTHERN CALIFORNIA, School of Accounting, is seeking candidates for faculty positions leading to tenure. Faculty positions above the assistant rank are also possible for individuals with strong teaching and publication record. Candidates for assistant professor should have a doctorate in hand or be near completion of the dissertation, strong teaching ability and interest in research. The University of Southern California is an equal opportunity, affirmative action employer. Applications are encouraged from women and minority persons. Please contact Professor Doyle Z. Williams, Dean, School of Accounting, University of Southern California, Los Angeles, California 90089-1421.

#403 OREGON STATE UNIVERSITY has openings for tenure-track faculty positions at the Assistant/Associate professor level which will become available during the 1987-88 academic year. Rank is dependent upon qualifications. Most interest areas can be accommodated, although preference will be given to candidates in financial, managerial, and auditing. Responsibilities include quality teaching, research, and professional activities in the field of accounting. Candidates should hold the appropriate doctorate or have substantially completed the degree requirements. Professional certification is desirable. Salary is competitive, fringe benefits are excellent. Candidates should send a letter of application and resumé to: Charles Neyhart, Chairman, Department of Accounting, College of Business, Oregon State University, Corvallis, OR 97331. Applications will be accepted until December 1, 1986. Oregon State University is an Equal Opportunity/Affirmative Action Employer.

#404 GEORGE WASHINGTON UNIVERSITY, Department of Accountancy invites applications for tenure-track positions in accounting. Candidates are expected to possess a doctoral degree or be near completion of degree and should be dedicated to teaching excellence and research. GWU is an equal opportunity, affirmative action employer. Please send vita to Professor Michael Gallagher, Chairman, Department of Accountancy, George Washington University, 710 21st Street, NW, Room 209, Washington, DC 20052. Telephone (202) 676-6825.

#405 APPLICATIONS FOR POSITIONS IN ACCOUNTING, at all professorial ranks, are invited from qualified persons having teaching and research interests in the areas of auditing, financial, health care, information systems, managerial, and public policy. A Ph.D. is required. Demonstrated ability or potential for effective teaching and quality research are important considerations. The University of Pennsylvania is an equal opportunity/affirmative action employer. Interested persons should send their resumé including educational background, professional experience, publications, personal data, and, if applicable, a dissertation proposal and abstract to: Professor Robert E. Verrecchia, Accounting Department, Suite 2400 Steinberg Hall-Dietrich Hall, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6365.

#406 TEMPLE UNIVERSITY seeks applicants for accounting faculty positions. Rank is dependent on candidate's qualifications. Salaries are competitive, fringe benefits are excellent. Candidates should hold a doctorate in accounting or ABD with substantial progress toward completion. CPA or CMA is a plus. The Department desires well-balanced performance by its faculty, including teaching excellence, publications, and service. BBA, MBA, MS in Tax, and Ph.D. programs are offered. Temple University is located in historic Philadelphia and is a short drive from the Pocono Mountains and the Jersey shore. Apply to: Dr. Stephen L. Fogg, Chairman, Department of Accounting, School of Business Administration, Temple University, Philadelphia, PA 19122. Telephone (215) 787-1915. Temple University is an equal opportunity, affirmative action employer. Qualified minorities and women are encouraged to apply.

#407 STEPHEN F. AUSTIN STATE UNIVERSITY anticipates a tenure-track position for the Fall 1987 semester. Preferred level of appointment is at the assistant level, but appointments will be considered at any rank dependent upon qualifications. Earned doctorate is preferred, but advanced ABDs will be considered. Professional certification is desirable. SFASU is a 12,500 student body, state-supported university located in Nacogdoches, Texas, 130 miles north of Houston and 160 miles southeast of Dallas. The School of Business Administration is AACSB-accredited with more than 4,000 majors. The Department of Accounting has approximately 700 majors with 16 full-time faculty. Interested candidates are invited to submit their resumé to Professor Sammie L. Smith, Chairman, Department of Accounting, Stephen F. Austin State University, Nacogdoches, TX 75962. SFASU is an Equal Opportunity, Affirmative Action Employer.

#408 ASSOCIATE PROFESSOR (TAXATION) at a major private institution with respected Master of Taxation program seeks visiting professorship for 1987–1988 AND/OR summer teaching for any summer session after 1986. Coastal or resort areas preferred for summer. Areas of expertise are Partnership, Estate, Gift and Fiduciary Taxation. Three years "Big Eight" experience and twelve years teaching experience. Please write for vita.

#409 UNIVERSITY OF NEW ORLEANS invites applications for the position of Assistant or Associate Professor of Accounting. Candidates should have the Ph.D. or DBA degree. Evidence of excellence in teaching, research, and professional activities is necessary. Salary is negotiable and competitive. The University offers the M.S. in Accounting and the M.S. in Accounting (tax option), as well as the M.B.A. Approximately 700 undergraduate accounting majors are enrolled. The University has AACSB accreditation at both the undergraduate and graduate levels. Candidates should send resumé to Professor R. J. Thacker, Chairman, Department of Accounting, College of Business Administration, University of New Orleans, New Orleans, LA 70148. UNO is an Affirmative Action, Equal Opportunity Employer.

#410 CASE WESTERN RESERVE UNIVERSITY is seeking applicants for tenure-track faculty positions in accountancy. Qualifications required include a demonstrated capacity to undertake high quality research and teaching in undergraduate and graduate professional accountancy courses. Skills in several specialization areas such as Auditing, Taxation, Not-for-Profit, and Financial Accounting are preferred. A doctorate or the equivalent terminal qualification and experience is required. J.D.-Ph.D. qualification for Tax/Law instruction also being sought. Rank and salary depend upon qualifications. Send resumé and references to Gary John Previts, Weatherhead School of Management, Case Western Reserve University, Sears Library Building, Room 607, Cleveland, Ohio 44106. Case Western Reserve University is an Affirmative Action/Equal Opportunity Employer.

#411 TEXAS TECH UNIVERSITY invites applications for permanent faculty positions in Accounting beginning Fall 1987. Positions are expected to be available at the assistant and associate ranks for teaching and research interest in financial accounting, systems, and auditing. Doctorate required. Certification desirable. Competitive salaries commensurate with experience and education. Texas Tech offers accounting programs at the undergraduate, masters, and doctoral levels. Apply to Professor Gary E. White, College of Business Administration, Texas Tech University, P.O. Box 4320, Lubbock, Texas 79409. Affirmative Action/Equal Opportunity Employer.

#412 THE UNIVERSITY OF MANITOBA is seeking applicants for tenure-track positions in accounting for July 1987. Rank is open, based on qualifications and experience. A visiting appointment is also possible. Ph.D. or DBA, completed or near completion, is required. Duties include research and teaching at the undergraduate and graduate levels. Salary is competitive and will depend on qualifications, experience, and research record. Winnipeg, a multi-cultural city of 600,000, offers the best of an urban environment in the heart of Canada's vacation land. Both women and men are encouraged to apply. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Applications should be sent to: Dr. L. I. Gould, Head, Department of Accounting and Finance, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

#413 ALL POSITIONS, tenure-track, for the 1987–88 year. Minimum qualifications: Ph.D. or DBA in Accounting (ABD considered if dissertation in process). Undergraduate and graduate level teaching. Salary is competitive. Send resumé to: Teddy L. Coe, Department of Accounting, North Texas State University, Denton, Texas 76203. NTSU is an Equal Opportunity, Affirmative Action Employer.

#414 DUKE UNIVERSITY—The Fuqua School of Business is seeking highly qualified faculty in accounting. The qualifications required include a demonstrated interest in and capacity to do publishable research, and a high level of teaching competence in M.B.A. and Ph.D. classes. Candidates are expected to hold a doctorate degree or be near completion of the degree. Rank and salary depend upon qualifications. Send resumé and list of references to Professor Robert H. Ashton, Fuqua School of Business, Duke University, Durham, North Carolina 27706. Duke University is an Affirmative Action/Equal Opportunity Employer.

#415 UNIVERSITY OF SOUTHERN CALIFORNIA, School of Accounting, is seeking candidates for faculty positions leading to tenure with a primary interest in financial accounting, auditing, and managerial accounting. Faculty positions above the assistant rank are possible for individuals with a strong teaching and publication record. Candidates for assistant professor should have a doctorate in hand or be near completion of the dissertation, strong teaching ability, and an interest in research. The University of Southern California is an equal opportunity, affirmative action employer. Applications are encouraged from women and minority persons. Please contact Professor Doyle Z. Williams, Dean, School of Accounting, University of Southern California, Los Angeles, California 90089-1421.

#416 SOUTHWESTERN UNIVERSITY AT GEORGETOWN, TEXAS is seeking applicants for a tenure-track position in accounting. Rank is open, based on qualifications and experience, and a Ph.D. in Accounting is necessary. Southwestern University, located near Austin, Texas, is a small, well-endowed liberal arts college with a commitment to excellence in teaching and strong teacher/student relations. Research and professional growth is encouraged by an endowed faculty development program. Salaries are competitive with those of better universities. Send resumé and inquiries to Dean Theodore Lucas, Southwestern University, Georgetown, Texas 78626. Southwestern University is an Equal Opportunity/Affirmative Action Employer.

#417 UNIVERSITY OF CINCINNATI, College of Business Administration, seeks candidates for tenure-track faculty positions in the Department of Accounting. Candidates for Assistant Professor should have doctorate or be in advanced dissertation stage; evidence of research and teaching potential is required. Professional certification and business experience is desirable. Send resumé to: Dr. Donald E. Ricketts, University of Cincinnati, College of Business Administration, Department of Accounting/Business Law, Cincinnati, Ohio 45221-0130. The University of Cincinnati is an Affirmative Action/Equal Opportunity Employer.

#418 THE DEPARTMENT OF ACCOUNTING OF THE UNIVERSITY OF WYOMING is seeking qualified applicants for tenure-track positions at the rank of Assistant, Associate, or Full Professor for the fall of 1987. Qualifications for the rank of Assistant Professor include completion of a Ph.D. or D.B.A. degree and a strong commitment to high-quality teaching and research. Candidates for a senior position must have an established record in both areas. All resumés should be sent to: Keith H. Burdick, Chairman, Department of Accounting, College of Commerce & Industry, The University of Wyoming, Laramie, WY 82071. The University of Wyoming is an Equal Opportunity, Affirmative Action Employer.

#419 NORTH CAROLINA STATE UNIVERSITY invites applications for a tenure-track position in accounting beginning in the fall of 1986. An earned doctorate is required, although advanced ABDs will also be considered at the Assistant Professor level. Professional certification is highly desired. Important qualifications include demonstrated interest in and ability to do publishable research, and a commitment to teaching excellence. Please send resumés to Dr. Joanne Rockness, Accounting Search Committee, Department of Economics and Business, North Carolina State University, Box 8110, Raleigh, North Carolina 27695-8110. North Carolina State University is an affirmative action/equal opportunity employer.

#420 UNIVERSITY OF CALIFORNIA, DAVIS faculty position in accounting. One position, rank open, in Accounting, Graduate School of Administration. Duties include graduate instruction, course development, and a high level of research productivity; experience or demonstrated potential in managerial accounting, planning and control systems, or accounting information systems. Ph.D. or equivalent required. Send vita, names and addresses of four references to Gary M. Walton, Dean, Graduate School of Administration, A-2, University of California, Davis, CA 95616. Position open until filled, but to guarantee consideration, applications should be received by January 15, 1987; position available July 1, 1987. The University of California is an Affirmative Action/Equal Opportunity Employer.

#421 CHAIRPERSON, THE UNIVERSITY OF TOLEDO. The Department of Accounting invites nominations and applications for the departmental chairperson. Candidates should possess a doctorate, preferably with accounting as a major area of study. Applicants should have established credentials sufficient to support a senior level faculty appointment. Salary for the appointment is very competitive. The University of Toledo has an enrollment of approximately 20,000 students. The campus is located in an excellent neighborhood which enables many of the faculty to walk to their offices. The Accounting Department offers an undergraduate degree in accounting, as well as a Master of Science in Accounting degree and the MBA. Send vita to: Dr. Larry F. Konrath, Chairman, Department of Accounting, The University of Toledo, Toledo, OH 43606. The University of Toledo is an Equal Opportunity/Affirmative Action Employer.

#422 THE UNIVERSITY OF TOLEDO. The Department of Accounting invites applications for positions at the assistant or associate levels effective January or September 1987. Candidates should possess a doctorate with a specialty in accounting. ABDs will also be considered. Salary for the appointment is very competitive. The University of Toledo has an enrollment of approximately 20,000 students. The campus is located in an excellent neighborhood which enables many of the faculty to walk to their offices. The Accounting Department offers an undergraduate degree in accounting, as well as a Master of Science in Accounting degree and the MBA. Send vita to: Dr. Larry F. Konrath, Chairman, Department of Accounting, The University of Toledo, Toledo, OH 43606. The University of Toledo is an Equal Opportunity/Affirmative Action Employer.

#423 THE UNIVERSITY OF PUGET SOUND invites applications for a tenure-track Assistant/Associate Professor of Accounting to begin September 1987. Teach intermediate and advanced financial accounting courses; some introductory courses may also be required. Ph.D. or D.B.A. in Accounting, and commitment to undergraduate teaching, required. Preference will be given to applicants with a C.P.A., C.I.A. or C.M.A. certificate, prior college-level teaching experience and related work experience. Send vita and names of three references by December 5, 1986 to: Accounting Search, University of Puget Sound, P.O. Box 7297, Tacoma, WA 98407. An Equal Opportunity, Affirmative Action Educator/Employer.

#424 VIRGINIA COMMONWEALTH UNIVERSITY, RICHMOND, VA., invites applications for two tenure-track positions: one Associate and one Assistant. Research and teaching in managerial accounting, accounting systems, or auditing is required. Applicants must possess a doctoral degree in accounting or advanced dissertation stage for assistant professor. Professional certification preferred. Undergraduate and graduate accounting programs AACSB accredited. Contact Dr. John B. Sperry, Chairman, Department of Accounting, Virginia Commonwealth University, 1015 Floyd Avenue, Richmond, VA 23284. VCU is an equal opportunity, affirmative action employer. Qualified minorities, women, and members of other protected groups are encouraged to apply.

#425 POSITION WANTED: MBA/CPA, nine years teaching experience, three years varied accounting experience, some research, excellent teaching record; seeking tenure-track position. Prefer Northeast but will consider other locations. Available January 1987 or after.

#426 NORTHERN KENTUCKY UNIVERSITY seeks applicants for Accounting Faculty at the rank of assistant or associate professor; rank and salary dependent upon qualifications. Ph.D. or DBA in Accounting required. ABD's nearing completion of dissertation considered at instructor level. Candidates in auditing or systems preferred, although most areas can be accommodated. Northern Kentucky University is in the greater Cincinnati metropolitan area and offers the benefits of both urban and suburban environments. Deadline for applications is October 20, 1986 or until filled. Submit resumé or inquiries to Dr. L. M. Marquis, Chairman, Department of Accounting, College of Business, Northern Kentucky University, Highland Heights, Kentucky 41076. An affirmative action/equal opportunity employer and actively seeking the candidacy of minorities and women.

#427 DEPARTMENTAL CHAIR: WRIGHT STATE UNIVERSITY is seeking a Chair for the Department of Accountancy starting July 1987. Candidate must have doctorate and be qualified for appointment as an Associate/Full Professor. The Chair provides leadership to 12 full-time faculty and should have a proven record of excellence in teaching, research, and service. The candidate must be willing and able to maintain a strong relationship with the professional community and should have a professional certification. The College offers a BS with an Accounting Major and an MBA with an Accounting Concentration. Salary is competitive and is dependent on credentials and experience. Candidates should send a resumé to Professor Michael J. Cleary, Chair, Accounting Chairperson Search Committee, College of Business and Administration, Wright State University, Dayton, Ohio 45435. Application deadline is December 1, 1986.

#428 KENT STATE UNIVERSITY. Tenure-track positions in accounting for Fall 1987. Doctorate in accounting (or ABD advanced stages) required. CPA and/or CMA desirable. Rank and salary depend on qualifications. Specialties in all areas of accounting considered; special needs are in accounting systems and tax. Send resumés and inquiries to Dr. David F. Fetyko, Chairman, Department of Accounting, 434 BSA, Kent State University, Kent, OH 44242. Application deadline is November 7, 1986 or until positions are filled. Kent State is an Affirmative Action/Equal Opportunity Employer.

#429 SAN FRANCISCO STATE UNIVERSITY has accounting faculty openings beginning Summer or Fall 1987 in our AACSB-accredited undergraduate and master's programs. Salary and rank are open, commensurate with academic preparation and professional experience. For the tenure-track position, an appropriate doctoral degree or ABD status, professional experience and/or certification are required. A faculty member is expected to teach accounting undergraduate and graduate courses, to engage in instructional and professional activities, and research; major emphasis is teaching effectiveness. San Francisco State is an Equal Opportunity/Affirmative Action/Handicapped/Title IX Employer. Send application letter and resumé to Professor James F. Schremp, Chair, Department of Accounting and Finance, School of Business, San Francisco State University, 1600 Holloway Avenue, San Francisco, California 94132. Closing date for applications is February 15, 1987.

#430 RUTGERS—The State University of New Jersey; Camden, NJ. Assistant/Associate Professor position expected to be available in accounting. Ph.D., and for Associate Professor, strong publication record is essential. Research orientation essential. Teach MBA and undergraduate courses in metropolitan Philadelphia area close to beaches and mountains. Salary and rank are dependent on qualifications. Send resumé to Dr. Rick Elam, Dean of Faculty of Business Studies, Rutgers University, Camden, New Jersey 08102.

#431 LEWIS AND CLARK COLLEGE seeks visiting professor for 1987/88 academic year. This may lead to a permanent position. Will be responsible for managerial and cost accounting courses, and other courses in the undergraduate accounting/business curriculum compatible with background and interests. Teaching excellence, research, and professional activities are expected of candidates for a permanent position. An appropriate doctorate is required. Rank and salary are open and commensurate with candidate's qualifications. Lewis and Clark is a private institution with approximately 1,500 students. Send vita to: Dr. Phillip Senatra, Department of Business & Administrative Studies, Lewis & Clark College, Portland, OR 97219. Closing date January 14, 1987. Affirmative Action/Equal Opportunity Employer.

#432 POSITION WANTED: Ph.D. in Accounting. Currently a full professor at a Canadian university. Twelve years of full-time teaching experience, ten of which were in U.S. universities. Many publications, including several books. Also active in professional organizations. Seeks a full-time, tenure-track full professorship beginning September 1987.

#433 SOUTHWEST MISSOURI STATE UNIVERSITY is seeking highly qualified faculty members in accounting. The qualifications required for these positions are demonstrated excellence in teaching and an interest in and capacity to do publishable research. Applicants must possess a doctorate or equivalent (Ph.D., DBA, LLM/CPA). Compensation is competitive. SMSU enrolls over 3500 students in undergraduate and graduate business programs. Pleasant suburban location with ready access to outstanding outdoor recreation areas. Review of applicants begins October 1, 1986; open until filled. Forward vita to Richard Nichols, Accounting Department, Southwest Missouri State University, Springfield, MO 65804.

#434 SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE. Applications are invited for a junior and a senior faculty position in accounting at the assistant or associate level beginning on September 1, 1987. A Ph.D. or DBA degree is required (ABD will be considered for the assistant professor level). The candidate considered for the senior position must have an established record of outstanding research. The College of Business and Administration is accredited by the AACSB and it has over 600 undergraduate and 40 graduate accounting majors. In addition, the College offers an MBA degree, an M.Acc. degree, and a DBA degree with an Accounting concentration. Salary will be competitive with current market rates dependent upon the candidate's qualifications and experience. Send resumé to Dr. Frederick H. Wu, Chair, Department of Accountancy, Southern Illinois University, Carbondale, Illinois 62901. SIU-C is an affirmative action employer.

#435 FACULTY POSITION—CARNEGIE-MELLON UNIVERSITY is searching for Assistant Professors to teach accounting in graduate and undergraduate programs. Individuals should have the potential for excellence in research, and training in the disciplines of economics, finance, mathematics, and statistics. Applicants should submit a current vita and evidence of research such as publications, working papers, or dissertation proposal and chapters to: Professor Stanley Baiman, Graduate School of Industrial Administration, Carnegie-Mellon University, Pittsburgh, PA 15213. Carnegie-Mellon University is an equal opportunity/affirmative action employer.

#436 THE UNIVERSITY OF NORTH DAKOTA invites applications for tenure-track accounting faculty appointments in June or August 1987. Candidates must hold terminal degrees in appropriate fields, with skills and aptitudes for teaching excellence and scholarly research. Rank appropriate to qualifications and experience. Salary competitive, fringe benefits excellent. Send resumé to Professor Ludwik Kulas, Chairman, Department of Accounting and Business Law, College of Business and Public Administration, University of North Dakota, Grand Forks, ND 58202. UND is an Equal Opportunity, Affirmative Action Employer.

#437 THE UNIVERSITY OF CALGARY, Faculty of Management, invites applications for tenure-track positions in auditing, financial and managerial accounting commencing Fall 1987 or Winter 1988. Candidates should have a Ph.D., or DBA with a major in accounting. ABD's in advanced dissertation stage will be considered. Normal teaching load is six hours per term. Computer assistance and research support are available. Calgary is a dynamic city with a current population of 600,000. The city is Canada's "oil capital," a major financial center and the site for the 1988 Winter Olympic Games. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents. Applications should be addressed to Dr. J. R. Brent Ritchie, Associate Dean (Research and Development), Faculty of Management, The University of Calgary, 2500 University Drive N.W., Calgary, Alberta T2N 1N4.

#438 MIAMI UNIVERSITY, located in Oxford, Ohio (just outside Cincinnati), invites applications for a position at the rank of Assistant Professor effective fall 1987 or spring 1988. Doctorate or dissertation stage required; professional certification preferred. Teaching is considered most important in faculty evaluation; research is considered important. Small class size in a state university with highly competitive admissions. Nine-hour teaching load with three preparations during the academic year. $6,000 summer research support for the summer following the first year with similar program for continuing faculty. IBM PCs in most faculty offices. Applications should be directed to Professor Charles G. Carpenter, Chair, Department of Accountancy, Miami University, Oxford, Ohio 45056.

#439 THE UNIVERSITY OF WISCONSIN-MILWAUKEE is seeking an Assistant Professor in Accounting for Fall 1987. All areas considered with particular needs in Financial Accounting and Auditing. Ph.D. must be completed. Summer teaching and research support opportunities. Salary is competitive. Letter of application and resumé to Dr. Paul M. Fischer, School of Business Administration, University of Wisconsin-Milwaukee, P.O. Box 742, Milwaukee, WI 53201. An Affirmative Action/Equal Opportunity Employer.

#440 STANFORD UNIVERSITY Graduate School of Business invites applications for position as Assistant Professor of Accounting, effective September 1987. Candidate must have or be completing Ph.D., and must possess skills in and have an aptitude for scholarly research and graduate-level (M.B.A. and Ph.D.) teaching. Stanford University is an Equal Opportunity Employer and welcomes applications from qualified minorities and women. Applications should be received by December 15, 1986, and should include resumé, thesis proposal or abstract, transcript of grades from universities attended, names and addresses of three references, and copies of any research papers and publications. Applications must be forwarded in entirety to the Associate Dean for Academic Affairs, Graduate School of Business, Stanford University, Stanford, California 94305.

#441 CALIFORNIA STATE UNIVERSITY, SACRAMENTO has accounting faculty openings, effective January or August 1987, in its accredited AACSB undergraduate and master programs. Salary and rank open, commensurate with academic preparation and professional experience. For tenure-track positions, applicants must hold an appropriate doctoral degree; professional experience and/or certification are recommended. Primary emphasis is on teaching effectiveness; research/scholarly productivity is required. Applicants in final stages of doctoral study may be considered for nontenure-track positions that may be converted to tenure-track if the doctorate degree is completed during the term of appointment. Visiting appointments with doctoral degrees or with major preparation and professional accomplishments (one-year temporary employment) may be available as needed. Send application letter and resumé to Chair, Department of Accountancy, School of Business and Public Administration, California State University, 6000 J Street, Sacramento, CA 95819-2694. Closing dates for applications are November 1, 1986 for January 1987 appointments, and March 1, 1987 for August 1987 appointments. CSU, Sacramento is an Equal Opportunity/Affirmative Action/Handicapped/Title IX/Vietnam Era Veteran Employer.

#442 THE UNIVERSITY OF COLORADO AT DENVER seeks applications for faculty positions at the advanced Assistant, Associate, and Full Professor levels. Qualifications include a doctoral degree and commitment to excellence in research and teaching. The College of Business on the Denver Campus has recently become an independent unit and has grown from a faculty of 10 in 1980 to over 40 research-oriented faculty members in the current year. Salary and research support are competitive. Recruiting begins immediately and continues until the positions are filled. Contact Professor Dennis Murray, University of Colorado at Denver, College of Business, 1475 Lawrence Street, Denver, CO 80202. The University is an Equal Opportunity, Affirmative Action Employer.

#443 PURDUE UNIVERSITY. Applicants are invited for positions in accounting at both the junior and senior levels for appointments beginning in August 1987 or January 1988. A Ph.D. or D.B.A. degree is required. Candidates for appointment as assistant professor must exhibit capacity for quality research and teaching. Candidates for appointment as associate or full professor must have a record demonstrating excellence in research and teaching. Resumés should be sent, before March 15, 1987, to Professor William Kross, School of Management, Purdue University, West Lafayette, Indiana 47907. Telephone 317-494-4469. Purdue University is an Affirmative Action, Equal Opportunity Employer.

#444 THE UNIVERSITY OF RICHMOND has a tenure-track position in accounting for the 1987–88 school year. Rank and salary are open depending on qualifications. Candidates should have a Ph.D. or DBA in Accounting and a primary interest in the cost/managerial area. The teaching load is 9–12 hours with two preparations. Release time is available for research. Class sizes average 20–30. The University places strong emphasis on excellence in teaching but also expects and supports a modest research output. In addition, faculty are encouraged to become involved in the business community. The University of Richmond is located on a beautiful residential campus at the edge of Richmond, Virginia. It has a $200 million endowment, placing it among the top 50 endowments in the country. The University of Richmond is an equal opportunity/affirmative action employer. Contact: Francis A. Bird, Chair, Accounting Department, E. Claiborne Robins School of Business, University of Richmond, VA 23173.

#445 GEORGIA COLLEGE invites applications for a visiting professor or full-time tenure-track position. Candidates should have a doctorate in accounting (ABD will be considered). Teaching responsibilities include undergraduate and MBA accounting courses. Salary and rank commensurate with qualifications and experience. Georgia College with approximately 4,000 students is 30 miles northeast of Macon and 95 miles southeast of Atlanta. The College is an equal opportunity, affirmative action employer. Send letter of application, resumé, official transcripts, and the names, addresses, and telephone numbers of three references to: Mr. Don Rouk, Chairman, Accounting Search Committee, School of Business, CPO 015, Milledgeville, GA 31061.

#446 HENRY RUTGERS RESEARCH FELLOWSHIPS. Rutgers, The State University of New Jersey, Department of Accounting in Newark, invites applications or nominations for receipt of a Henry Rutgers Research Fellowship. The Fellowships are awarded to outstanding junior faculty who show real promise as world-wide scholars in the area of accounting, taxation, or law. Candidates must have completed doctoral studies at an accredited research-oriented institution and present evidence of research and scholarly activity and publication in leading journals. In addition to a field of specialization, candidates should have supporting competency in information systems and computers, the behavioral sciences, and quantitative methods. The successful candidate will receive two-year teaching appointments with reduced teaching loads, at the rank of Assistant Professor, a substantial initial stipend to support research activities, a personal computer, liberal travel support, a teaching/research assistant, summer support, and a generous salary and benefit package. It is expected that successful candidates will seek to negotiate permanent affiliation with the University at the end of the initial two-year appointment. Applications, nominations, or inquiries should be addressed to Dr. David J. Zaumeyer, CPA, Chairman, Department of Accounting, 214 Bradley Hall, Newark, NJ 07102. Rutgers is an Equal Opportunity/Affirmative Action Employer.

#447 TENURE-TRACK POSITIONS IN ACCOUNTING. Rutgers, The State University of New Jersey, Department of Accounting in Newark invites applications for tenure-track positions in the following areas: Financial Accounting, Managerial Accounting, Governmental/Social Accounting. These positions carry appointments at the Assistant or Associate Professor levels, a reduced teaching load, and modest advisement and other departmental responsibilities. We are particularly interested in applicants who are committed to careers in teaching and can demonstrate ability in (or potential for) outstanding research and publication. The Department has adequate resources to support such interests and activities. Applicants should have an earned doctorate in an appropriate field of study (ABD status may be acceptable), experience in teaching and accounting practice, and a professional certificate or license. Salary and benefits are competitive; travel support, research assistants, and compensated annual leaves available. Interested candidates should submit full curriculum vitae to Dr. David J. Zaumeyer, CPA, Chairman, Department of Accounting, 214 Bradley Hall, Newark, NJ 07102. Rutgers is an Equal Opportunity/Affirmative Action Employer.

#448 WESTERN ILLINOIS UNIVERSITY seeks candidates with Ph.D./D.B.A. for two tenure-track positions, available August 1987. Most specializations may be accommodated; preferences in Auditing and Systems. Professional certification desirable. Candidates must be committed to teaching excellence and quality research. Rank and salary dependent upon qualifications. Western Illinois University's College of Business is AACSB-accredited at the undergraduate and graduate level. WIU is an Affirmative Action/Equal Opportunity Employer. Send resumé to Professor Penelope J. Yunker, Chair, Department of Accountancy, Western Illinois University, Macomb, IL 61455.

#449 THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN invites applications and nominations for Head of the Department of Accountancy. The department consists of 32 faculty and has strong professional support. Preferably, applicants should have an earned doctorate and a demonstrated record of quality instruction, publication, and professional activities. Experience in administration is also desirable. Salary open. Search open until October 31 or position filled. August 1987 starting date. Send inquiries and vita to: Professor James Gentry, Chair, Accountancy Head Search Committee, 330 Commerce West, 1206 S. Sixth Street, Champaign, Illinois 61820; (217) 333-0120. Attn.: Jan Kane. An affirmative action, equal opportunity employer.

#450 UNIVERSITY OF MARYLAND (COLLEGE PARK) invites applications for faculty positions in Accounting. The minimum qualification for Assistant Professor is a Ph.D. degree. A candidate for Associate or Full Professor should have a distinguished publication record and a record of quality teaching. Interested candidates should send resumés to Professor Martin Loeb, College of Business and Management, University of Maryland, College Park, MD 20742. The University of Maryland is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply.

#451 WESTERN WASHINGTON UNIVERSITY invites applications for a tenure-track position in Accounting beginning Fall of 1987. Candidates with a Ph.D. or DBA in Accounting preferred. ABD considered. A professional certification is desired. Duties include teaching undergraduate and MBA courses, university service, and scholarly research. Western is a university of 10,000 students, located in beautiful Puget Sound between Seattle and Vancouver, B.C. Please send letter of interest and vita to Professor Ronald N. Savey, Chairman, Accounting Department, Western Washington University, Bellingham, Washington 98225. Deadline for applications is December 31, 1986. Western Washington University is committed to enhancing the diversity of the faculty; women and minorities are encouraged to apply. Western is an Affirmative Action/Equal Opportunity Employer.

#452 POSITION WANTED: Assistant Professorship in Accounting—or joint appointment between Accounting and Finance—at University with a strong commitment to support analytical research. *Doctorate Completed* (1986): Stanford GSB. Training in Decision Sciences, Finance, and Accounting. *Employment Experience*: Management Information Systems at Bell Telephone Laboratories. Teaching experience and two publications in Finance. *Research Interests*: Optimal governmental Taxation and Debt policies; Principal-Agent problems; Information Economics of Capital Markets; Auditing theory. *Teaching Interests*: Taxation; Managerial Accounting; Auditing theory; all areas of Finance. Contact: Ed Robbins, Department of Finance, University of Arizona, Tucson, AZ 85721. (602) 621-7490.

#453 SAN JOSE STATE UNIVERSITY is seeking candidates for faculty positions leading to tenure, or for temporary positions as Visiting Professors or full-time lecturers. Preferably, candidates for appointment at the rank of Associate Professor should possess a doctorate and CPA, but applicants who are in the advanced dissertation stage will be considered. Candidates for Professor must possess a doctorate, a demonstrated record of teaching excellence, and a strong record of publications and/or professional involvement. The areas of greatest need are *accounting information systems* and *taxation*. We are an equal opportunity/affirmative action employer and encourage applications from women and members of minority groups. Applications should include a curriculum vita, names and addresses of three references, transcript of grades from universities attended, and copies of any research papers and/or publications. Applications should be addressed to Dr. Joseph E. Mori, Professor and Department Chair, Department of Accounting and Finance, School of Business, San Jose State University, San Jose, CA 95192-0066.

#454 THE UNIVERSITY OF IOWA is seeking applicants to fill permanent or visiting Assistant, Associate and/or Full Professor positions beginning Fall 1987. Principal qualifications are: (1) terminal degree (Ph.D. or D.B.A.) (Assistant Professor may be A.B.D.); (2) genuine interest in accounting research and in working closely with undergraduate and graduate students; (3) Senior Professors must have established record of quality teaching and research with demonstrated competence in directing doctoral theses; (4) all candidates must have long-term interest in teaching. Screening will begin on receipt of a resumé sent to: John H. Smith, Department of Accounting, College of Business Administration, University of Iowa, Iowa City, Iowa 52242. This announcement will remain open until all positions are filled. The University of Iowa is an equal opportunity, affirmative action employer.

#455 POSITION WANTED. Mature scholar/teacher, Ph.D./CPA, presently tenured Full with specialty in computer auditing and artificial intelligence. Seeks visiting position for Summer or Fall.

#456 LOUISIANA STATE UNIVERSITY, Department of Accounting, anticipates faculty openings for the Fall of 1987. Available openings are at the assistant, associate, and full ranks. Assistant candidates should have a doctorate or be near completion of their doctoral program. Applicants at the upper ranks must have a commensurate research and professional service record. Faculty are generally expected to teach six to nine hours per semester and be actively involved in research and professional service. The University is an Equal Opportunity, Affirmative Action Employer. Please send resumés and references to: Dr. Vincent C. Brenner, Chairman, Department of Accounting, College of Business Administration, Louisiana State University, Baton Rouge, LA 70803.

#457 BABSON COLLEGE invites applications for anticipated tenure-track accounting faculty positions at the assistant and associate professor levels to teach undergraduate/graduate courses in financial/managerial accounting. Doctorate is required, ABDs in final stages considered. Professional certification desirable. Babson places priority on excellence in teaching, and encourages and supports applied research. Qualified candidates should mail resumés to Professor John Leslie Livingstone, Chairperson—Division of Accounting, Babson College, Wellesley, MA 02157. Babson is an equal opportunity/affirmative action employer. Qualified women and minorities are encouraged to apply.

#458 ACCOUNTING: Full-time, tenure-track position starting September 1987. Teach undergraduate and MBA courses, especially in the managerial, cost, and controllership areas. Master's and professional accounting certification required, doctorate in accounting preferred. Prior business experience essential. We seek candidates who are comfortable with and can contribute to the mission of a Catholic liberal arts college which is dedicated to the total development of the individual student. We emphasize quality teaching, strong teacher/student relationships, and research and/or consulting. Send resumé to Frank Coglitore, College of St. Thomas, Box 6010, 2115 Summit Avenue, St. Paul, Minnesota 55105.

#459 ILLINOIS INSTITUTE OF TECHNOLOGY. The School of Business Administration invites applications for a faculty position at the Assistant Professor or Associate Professor level in the area of Accounting. A doctoral degree in business or management with a major in accounting is required. An emphasis on managerial accounting with an interest in computer-based systems manufacturing and service organizations is preferred. Summer teaching is available. Full-time faculty is expected to develop a research area and publish. Position available August 1987. Send resumé to Dr. M. Zia Hassan, Associate Dean of the School of Business Administration, Illinois Institute of Technology, Chicago, Illinois 60616. IIT is an affirmative action, equal opportunity employer.

#460 FLORIDA ATLANTIC UNIVERSITY, School of Accounting, seeks applicants for tenure-track (assistant or associate) faculty starting Spring or Fall 1987. Anticipated needs are in the areas of financial, cost, and not-for-profit accounting. A Ph.D., D.B.A., or ABD in accounting is necessary, and teaching excellence, research, and professional activity are expected. The College of Business and Public Administration is AACSB-accredited. FAU is an Equal Opportunity/Affirmative Action Employer and applications from minorities and women are encouraged. Please send vita to: Dr. Carl Dennler, Jr., Director, School of Accounting, Florida Atlantic University, Boca Raton, Florida 33431.

#461 THE UNIVERSITY OF MINNESOTA'S DEPARTMENT OF ACCOUNTING invites applications for the position of Assistant Professor of Accounting (other ranks subject to qualifications and department needs). Applicants should possess a Ph.D. or should expect to obtain a Ph.D. before beginning employment. Responsibilities include conducting research, advising Ph.D. students, and teaching. A visiting position will be considered. Two applicant pools will be formed. Applications should be received prior to October 30, 1986 or February 15, 1987 for permanent positions; and December 30, 1986 or May 15, 1987 for visiting positions. The University of Minnesota is an equal opportunity educator and employer and specifically invites and encourages applications from women and minorities. David A. Dittman, Professor and Chairman, Department of Accounting, University of Minnesota, 271 19th Avenue South, Minneapolis, MN 55455. (612) 624-7390.

#462 GONZAGA UNIVERSITY, Spokane, Washington, seeks applicants for two tenure-track accounting faculty positions—financial/public accounting and tax. Candidates should hold a doctorate in accounting or ABD nearing completion. Professional certification and related work experience are pluses. The School of Business Administration desires well-balanced performance by its faculty, including teaching excellence, publications, and service. Gonzaga is a Jesuit university with an enrollment of 3,500. Enrollment in the School of Business is approximately 550 undergraduate and 100 MBA students. Spokane is an all-American city of 300,000 within an hour's drive of 70 lakes, 3 ski resorts, and several national parks. Apply to: Dr. Larry Lewis, Chairman, Department of Accounting, School of Business Administration, Gonzaga University, Spokane, WA 99258.

#463 CHAIRPERSON, GEORGE MASON UNIVERSITY. The Department of Accounting and Business Legal Studies invites nominations and applications for the departmental chairperson effective September 1, 1987. Candidates should possess a doctorate, preferably with accounting a major area of study. Applicants should have established credentials sufficient to support a senior level faculty appointment with tenure. Salary for the appointment is very competitive. George Mason University, the State University of Northern Virginia, is located approximately 20 miles west of Washington, DC. The University is a dynamic, growing institution with 17,000 students. The School of Business Administration has over 3,400 students of which over 400 are accounting majors. Graduate offerings include an MBA program and an M.S. in Accounting program. The Search Committee will begin considering candidates after December 1, 1986. Inquiries, nominations, or applications should be sent to: Accounting/Business Legal Studies Chair Search Committee, School of Business Administration, George Mason University, 4400 University Drive, Fairfax, VA 22030. George Mason University is an Affirmative Action/Equal Opportunity Employer.

#464 NORTHEAST LOUISIANA UNIVERSITY is seeking qualified faculty members in accounting at all ranks. Candidates should hold the doctorate and necessary dedication to excellence in teaching, research, and professional activities. Publications are required for upper ranks; salary is very competitive and negotiable. BBA and MBA degrees are accredited by the AACSB. The University of 11,500 students is located in a metropolitan center of over 100,000 people. The Department of Accounting enrolls over 600 majors and enjoys an outstanding academic and professional reputation. Please send resumé to Professor James T. Hood, Department of Accounting, Northeast Louisiana University, Monroe, LA 71209-0110. Northeast Louisiana University is an Equal Opportunity, Affirmative Action Employer.

#465 CALIFORNIA STATE UNIVERSITY, CHICO Department of Accounting and Management Information Systems within the College of Business has a faculty vacancy for a tenure-track position in the areas of auditing, taxation, and management information systems. Candidates must have a Ph.D. or D.B.A. Teaching performance, scholarly productivity, and university service record are essential attributes for appointments at advanced rank. The Department offers graduate and undergraduate accounting degrees and a program in Management Information Systems. The M.B.A. and Business baccalaureate programs are AACSB-accredited. CSU, Chico is located in northern California, with outstanding summer and winter recreation available. Housing costs in Chico approximate midwestern metropolitan levels. Send resumé to Dr. Steve Adams, Professor and Chair, Department of Accounting and Management Information Systems, California State University, Chico, CA 95929-0011. Application deadline is December 1, 1986. CSU-C is an Affirmative Action/Equal Opportunity Employer.

#466 NORTHERN ILLINOIS UNIVERSITY is looking for faculty starting August 1987. Due to possible expansion, anticipated and possible tenure-track positions are at the Full, Associate, or Assistant level in auditing, systems, financial, managerial, and taxation. Terminal degree required, but ABDs will be considered at the Assistant level. CPA or other certification desirable. NIU faculty are committed to excellent teaching and professional involvement. Modest research requirements exist. Interested applicants should send resumé to John H. Engstrom, Chair, Department of Accountancy, Northern Illinois University, DeKalb, IL 60115, by November 15, 1986. Northern Illinois University is an Equal Opportunity, Affirmative Action Employer.

#467 CLARK UNIVERSITY, Graduate School of Management, invites applications for tenure-track faculty position in Accounting, starting September 1987. Ph.D./D.B.A. preferred; A.B.D. or M.B.A./CPA considered. Rank, salary, and benefits are competitive and dependent upon qualifications. Teaching load is 5 sections per year. Publication and professional activities are expected. Clark is a small, quality, private university in Worcester, New England's second largest city (42 miles west of Boston). Application deadline is March 15, 1987. Contact Dr. Richard J. Bartkowski, Assistant Professor of Accounting, Graduate School of Management, Clark University, 950 Main Street, Worcester, MA 01610. Clark University is an Equal Opportunity, Affirmative Action Employer.

#468 THE UNIVERSITY OF MICHIGAN-DEARBORN, School of Management, invites applications for anticipated vacancies in accounting. Rank open. Ph.D./D.B.A. with CPA/CMA preferred; ABDs considered. Position available September 1987. Application closing date November 3, 1986. Send application letter, resumé, three references and graduate transcript to Dean Robert L. Minter, School of Management, The University of Michigan-Dearborn, Dearborn, MI 48125-1491. The University of Michigan-Dearborn is an equal opportunity educator and employer and specifically invites and encourages applications from women and minorities.

#469 ACCOUNTING POSITION—THE UNIVERSITY OF AKRON. Faculty vacancy at the assistant/associate level, beginning September 1987. Earned doctorate (Ph.D. or DBA) and CPA, CMA or CIA preferred. ABDs also invited to apply. Candidates should be dedicated to teaching excellence and have an interest in both research and professional activities. The Department of Accounting offers the BS, MBA, and MS degrees in Accounting, as well as a Master in Taxation. Undergraduate and graduate programs in business are AACSB-accredited. Consideration will be given to all vitas received by November 15, 1986. Please mail to: Dr. Richard S. Roberts, Head, Department of Accounting, College of Business Administration, The University of Akron, Akron, OH 44325. The University of Akron is an Equal Education and Employment Institution.

#470 SIGMUND WEIS SCHOOL OF BUSINESS, SUSQUEHANNA UNIVERSITY, invites applications for assistant or associate professor of accounting. Earned doctorate preferred, ABD nearing dissertation completion considered. Successful candidate will teach intermediate, advanced/fund, or auditing course, plus principles/cost. He or she will be able to balance effective teaching with skillful advising of undergraduates and continuing scholarly research and publication. Competitive salary, TIAA/CREF and other benefits including IBM/PC. Appointment begins no later than August 25, 1987. Apply to: Dr. Edward Schwan, Head, Department of Accounting, Susquehanna University, Selinsgrove, Pennsylvania 17870. Susquehanna University is an affirmative action, equal opportunity employer.

#471 TAXATION, THE UNIVERSITY OF TULSA. The School of Accounting invites applications for a position in taxation effective September 1987 at the rank of Assistant or Associate Professor. Candidates should have an accounting doctorate with taxation as a major field; CPA is desirable. The University of Tulsa is a well-endowed, private university with 5,000 students. Business programs are accredited by the AACSB. The School has ten faculty members, 300 undergraduate majors, and offers M.S. degrees in Accounting and Taxation. Send vita to: Hans Johnson, Director, School of Accounting, The University of Tulsa, Tulsa, OK 74104. An equal opportunity, affirmative action employer.

#472 DBA (Accounting), CPA (non-practice) seeks position with AACSB-accredited university in southwestern U.S. Seventeen years teaching experience, most recently in accounting systems, international, and intermediate. Extensive work with microcomputers. Available Fall 1987.

#473 FACULTY POSITIONS IN ACCOUNTING—California State University, Fullerton is seeking accounting faculty to teach in its undergraduate and master's programs. Specific needs include auditing, systems, financial/international, tax, and financial accounting. Tenure-track applicants should have appropriate doctorate or ABD status and research potential. Lecturers require an appropriate doctorate or master's degree and CMA, CPA, or CIA. Rank and salary commensurate with qualifications. Inquiries and resumé should be sent to Dr. Trini U. Melcher, Chair, Department of Accounting, School of Business Administration and Economics, California State University, Fullerton, Fullerton, California 92634. Applications accepted until positions are filled. An equal opportunity, affirmative action employer.

#474 POSITION WANTED—MBA, CPA, CMA, Ph.D. (Physics) seeks Fall 1987 tenure-track position in a strong institution which emphasizes and rewards good teaching. Experience includes teaching (currently associate professor) and academic administration. Teaching experience includes most financial and managerial areas.

#475 OKLAHOMA STATE UNIVERSITY seeks applicants for the position of Head of the School of Accounting. The rank of the Head is Professor. The salary is competitive and negotiable depending upon the qualifications of the person selected. Applicants should have an earned doctorate, possess efficient administrative skills, be an effective teacher, and provide evidence of scholarly research achievements in research and publication. Applicants should be effective in communicating with professional groups and in obtaining outside support. The appointment date is Fall 1987. For full consideration, applications should be received by November 15, 1986. Send resumé to Dr. Lawrence H. Hammer, Search Committee Chairman, College of Business Administration, Oklahoma State University, Stillwater, OK 74078. An equal opportunity, affirmative action employer.

#476 CHAIRPERSON. TENNESSEE TECHNOLOGICAL UNIVERSITY seeks a senior scholar for Chairperson of the Department of Accounting and Finance, a unit of the College of Business Administration. The Department, a multi-disciplinary group of fifteen faculty, serves 700 undergraduate majors and offers a full range of accounting and finance courses, and basic law courses at the B.S. and M.B.A. levels. All programs in the College, including the accounting major, are AACSB-accredited. The Chairperson provides academic leadership and fosters departmental collaboration with other units of the College and University, the accounting profession, and the business community. The position requires strong leadership qualities and good interpersonal skills. Administrative experience not required, but highly desirable. Candidates must have doctorate and record of scholarly achievement commensurate with at least the rank of Associate Professor. Rank depends on qualifications, and salary is competitive. Anticipated starting date Fall 1987, but earlier date desirable. Send resumé to Dean Fred E. Williams, College of Business Administration, Box 5025, Tennessee Tech, Cookeville, TN 38505. Applications accepted until position is filled. TTU is an Affirmative Action/Equal Opportunity Employer.

#477 TENNESSEE TECHNOLOGICAL UNIVERSITY invites applications for a tenure-track position beginning Fall 1987. All levels invited to apply. Doctorate and appropriate level of scholarly achievement required for senior level, but promising ABDs considered at entry level. Professional certification a plus. Salary competitive with AACSB-accredited public universities. Position open until filled. Contact: Dr. Don R. Cook, Interim Chairperson, Department of Accounting and Finance, College of Business Administration, P.O. Box 5024, Tennessee Tech University, Cookeville, TN 38505. TTU is an Affirmative Action/Equal Opportunity Employer.

#478 THE AMERICAN UNIVERSITY IN CAIRO invites applications for an opening for an Assistant, Associate or Full Professor of Accounting to teach accounting courses in the undergraduate business administration and/or graduate management programs. Ph.D. and teaching experience required. English is the language of instruction. Two-year appointment begins September 1987; renewal possible. Rank and salary according to scale based on qualifications and experience. For expatriates, housing, air travel, and partial school tuition for dependents included. Write, with curriculum vitae, to: Dean of the Faculty, The American University in Cairo, 866 United Nations Plaza, New York, NY 10017, preferably before December 1, 1986.

#479 CALIFORNIA STATE UNIVERSITY, STANISLAUS seeks faculty in Accounting. Rank and salary open, depending on qualifications. Undergraduate and graduate programs. Teaching excellence, scholarship, and professional activity required. Require relevant doctorate earned or very close to completion. Prefer proven record of teaching excellence. CPA preferred. Strength in Auditing desired for one position. Modern facilities, rural setting, low-cost housing. 4–1–4 calendar eliminates disadvantages of traditional semester and quarter systems. Two-hour drive to San Francisco or High Sierra. Cal State Stanislaus is an Affirmative Action/Equal Opportunity/Title IX/Section 504 Employer. Applications and inquiries should be directed to: Dr. Robert Van Regenmorter, Chair; Accounting Faculty Search Committee; Department of Accounting; School of Business Administration; California State University, Stanislaus; Turlock, CA 95380; Telephone (209) 667-3671.

#480 POSITION WANTED: Ph.D., CPA seeks senior faculty position in Cost/Managerial or Financial Accounting. Fourteen years teaching experience at graduate and undergraduate levels. Excellent teaching, research and service records.

#481 TEXAS CHRISTIAN UNIVERSITY is seeking to fill several accounting positions at all professorial levels and at the Instructor level. Visiting appointments can be considered. The professorial positions require a Ph.D. degree, with the senior level requiring a substantial record of academic research. Instructors must hold a Masters degree. TCU is a well-endowed, private university of approximately 7,000 students. Applications will be accepted until the positions are filled. They should be sent to: Donald R. Nichols, Chairman, M. J. Neeley School of Business, Texas Christian University, Fort Worth, Texas 76129. TCU is an Equal Opportunity/Affirmative Action Employer.

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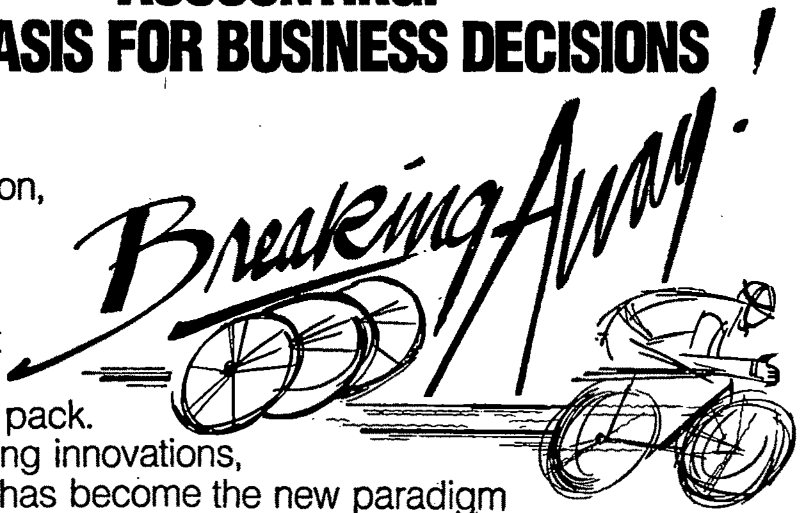
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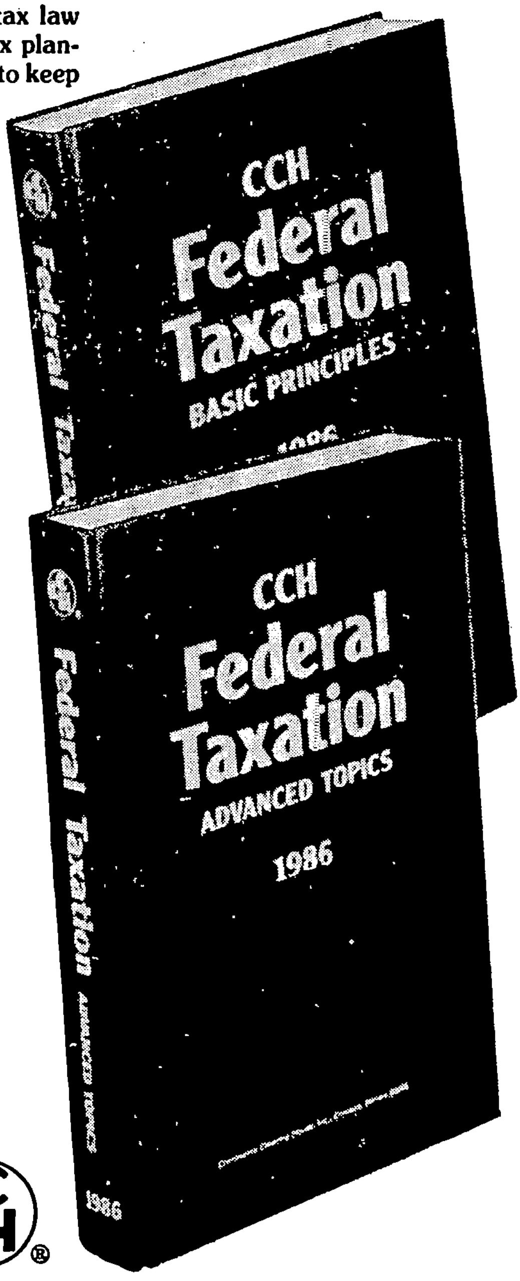

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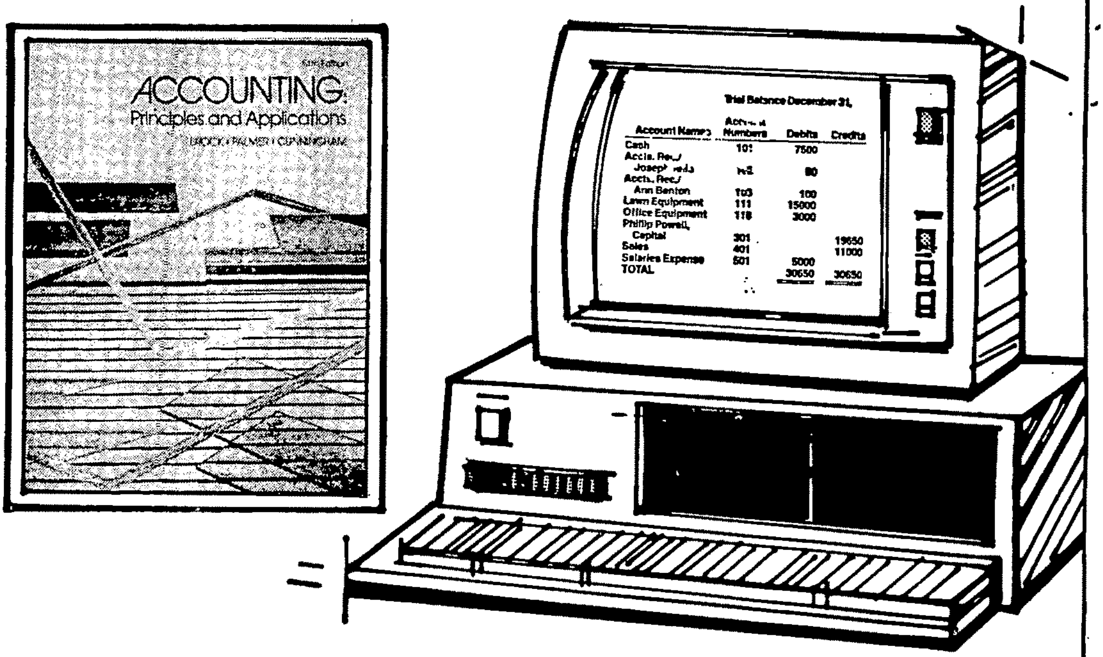
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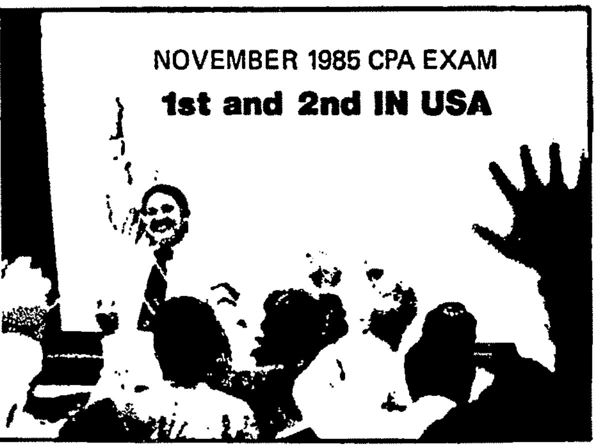

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The results indicated that, on an overall basis, respondents placed more emphasis upon conceptual knowledge than upon technical ability. Also, significant differences between importance responses of educators and practitioners were found for a majority of the questionnaire topics. The author discusses some implications of these and other findings in the concluding chapter and raises questions which can best be addressed through additional research. Also included in the publication is a lengthy bibliography which should be useful to researchers dealing with accounting education issues.

The findings should be interesting and useful to educators responsible for evaluating and developing accounting curricula. Likewise, textbook authors should find the study useful. The findings should also be of interest to accounting practitioners.

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